Before the
Federal Communications Commission
Washington DC 20554

In the Matter of:	)
	)
Plan for Reallocated	)
Spectrum	)

By the Commission:

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EXECUTIVE SUMMARY

1. The Omnibus Budget Reconciliation Act of 1993[1] (Budget Act) requires the transfer of at least 200 megahertz of spectrum from Government to private sector use. An immediate transfer of 50 megahertz was mandated, with a significant portion of the spectrum to be reserved until after a ten-year period. The remaining spectrum is to be allocated and assigned gradually over a ten-year period. The Budget Act further requires that the Federal Communications Commission prepare, submit to the President and the Congress, and implement a plan for the allocation and assignment under the Communications Act of 1934 of the frequencies not immediately transferred.

2. In its Spectrum Reallocation Final Report (Final Report), the National Telecommunications and Information Administration of the U.S. Department of Commerce (NTIA) identified 235 megahertz of spectrum to be transferred, in 12 bands of frequencies with different reallocation status and transfer dates for release from Government to non-Government use. Last year, the FCC acted to allocate the first 50 megahertz made immediately available and to develop rules for the utilization and assignment of this spectrum. This Spectrum Plan deals with the 185 megahertz of remaining spectrum. While not a proposal for the use of these bands, the Spectrum Plan identifies the scope and timing of future rule making proceedings in fulfillment of the requirements of the Budget Act. Congress anticipated that the FCC would be changing the plan in future proceedings and accordingly enacted appropriate provisions.

3. Aggregating Bands. The first step of this Spectrum Plan is to aggregate into fewer groups the 12 bands of frequencies that comprise the total spectrum to be transferred. This simplification shown below will facilitate the decision process by grouping together several of the bands that are contiguous or sufficiently close in frequency to have similar physical properties.

GROUP (MHZ)	**AVAILABILITY/ACCESS**
▸ Group 1:	
1390 - 1400	1999
1427 - 1432	1999
1670 - 1675	1999
1710 - 1755	2004

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[1] Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6001(a)(3), 107 Stat. 312 (approved August 10, 1993); see H.R. Rep. No. 103-213, 103rd Cong., 1st Sess. (1993). Relevant provisions of the Budget Act were codified under Title 47 U.S.C. and references will be to the codified text.

- Group 2:

2300 - 2310	Immediate
2390 - 2400	Reallocated 1995
2400 - 2402	Immediate
2402 - 2417	Reallocated 1995
2417 - 2450	Immediate

- Group 3:

3650 - 3700	1999

- Group 4:

4635 - 4660	1997
4660 - 4685	Reallocated 1995

4. Scheduling. In 1995, the FCC allocated 3 bands that made up the 50 megahertz initially transferred. In view of the fact that all of the remaining bands of Group 2 are immediately available and that the remaining band of Group 4 will become available in less than 10 months, the FCC plans to initiate promptly a rule making to allocate these bands and to develop appropriate service rules, thereby expeditiously placing these frequencies into private sector use. Similarly, the 1999 date for the availability of Group 3 frequencies, which make up the largest single band to be transferred, points to rule making for this band to be initiated during 1997. The bands of Group 1 would constitute the reserve frequencies that the Budget Act requires. Thus, in accordance with the timetable for the release of the bands, the following schedule for rule making proceedings is planned:

RULE MAKING PROCEEDINGS	**GROUP**
► Initiate 1996	Groups 2 & 4
► Initiate 1997	Group 3
► Initiate 2006	Group 1

5. Allocation. The FCC repeatedly has stated that its objective is to ensure that spectrum is put to its best and most valued use and that the greatest benefit to the public is attained. This goal will be paramount in our proceedings to address the remaining 185 megahertz. In its Report and Order allocating the first 50 megahertz, the FCC further stated that one way to achieve this goal is to adopt an allocation to both fixed and mobile services because permitting this broad use would allow licensees in commercial service to offer a wide

range of services employing varying technologies.[2] The approach was to allocate 25 megahertz for commercial fixed and mobile use without identifying specific services; it was further decided that licenses for the spectrum would be available through competitive bidding to the extent possible and practical. While affirming its belief that a general allocation would yield the most highly valued services for the public, it concluded that the remaining 25 megahertz should be allocated for unlicensed services rather than commercial fixed and mobile terrestrial uses. This also was predicted to yield public benefits in new service capabilities and sharing technologies, and to promote the Commission's goal of ensuring that spectrum is put to its best and most valued use.

6. On March 5, 1996, the Commission held an all-day *En Banc* hearing that specifically addressed how to formulate spectrum policy for all services, including commercial, private, and unlicensed applications in the United States and submission in international fora. In considering the appropriate use of the remaining 185 megahertz, the Commission intends to consider all options, including but not limited to those addressed in allocating the first 50 megahertz. As required by the Budget Act, this approach will ensure the availability of spectrum for, and the stimulation of the development of, a wide array of new technologies and services that will benefit the American public, some of which may not be currently envisioned.

7. Public Safety. Among the wide array of services that we will consider in allocating the remaining 185 megahertz is public safety use. The Omnibus Budget Reconciliation Act of 1993 requires the FCC to study the public safety spectrum needs and to develop a plan that ensures that adequate spectrum is available for public safety uses through the year 2010. At the Commission's *En Banc* hearing, representatives of public safety agencies outlined their spectrum needs, and in future proceedings the FCC will solicit comment on possible use of some of the transferred bands in support of safety of life and property as part of the national public safety planning activity that was initiated in November 1995. In a separate action the FCC and NTIA have chartered the Public Safety Wireless Advisory Committee to advise on operational, technical and spectrum requirements of Federal, state and local public safety entities through the year 2010. The report from the Advisory Committee is due to the FCC and NTIA in the summer of 1996 and will identify spectrum requirements and possible bands that would fulfill these requirements. The Advisory Committee is considering not only bands transferred in accordance with the Budget Act, but also other bands including frequencies currently used exclusively by the Federal Government and separately by the private sector. The FCC and NTIA will respond to the requirements and recommendations of the Advisory Committee within their respective areas of responsibility. In developing proposals for the remaining transferred frequencies, the FCC may identify possible use of some parts of this spectrum in support of the Advisory

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[2] First Report and Order and Second Notice of Proposed Rule Making, Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, ET Docket No., 94-32, FCC 95-47, released February 17, 1995, 10 FCC Rcd 4769 (1995).

Committee plan for public safety. A separate proceeding to deal with the public safety issues developed by the Advisory Committee will be initiated in the near future.

I. INTRODUCTION

8. The Budget Act required the transfer of at least 200 megahertz of spectrum from Federal Government to private sector usage.[3] An initial amount of spectrum, 50 megahertz, was to be transferred immediately on an expedited basis. A short and specific timetable was mandated for the withdrawal of Government assignments from these initial frequencies and for the reallocation of this spectrum and the proposal of regulations for assignment by the Federal Communications Commission. Continuation of the FCC's auction authority was contingent on meeting these milestones. These actions were completed as required within 18 months of the enactment date.[4]

9. In dealing with the remaining spectrum, Congress prescribed a different approach. Rather than detailed scheduled withdrawal of Government assignment, reallocation, and proposals for non-Government reassignment, Congress required the FCC to develop a plan with several statutory features that extend to over a decade. This Spectrum Plan is submitted in response to that requirement.[5]

10. The Budget Act requires the FCC to prepare, submit to the President and the Congress, and implement a plan for the allocation and assignment under the 1934 Act of the spectrum reallocated from the Federal Government, less the frequencies made immediately available.[6] The Spectrum Plan is due no later than one year after FCC receipt of the NTIA Spectrum Reallocation Final Report, in which the transferred spectrum bands are finally identified. This date is March 22, 1996.

11. Congress was concerned that the remaining spectrum not be proposed for immediate allocation and assignment and made several stipulations that, in effect, would extend such a process. The Plan is to take into account the timetable for the withdrawal of Government assignments as recommended by the Secretary of Commerce. A significant portion of the transferred spectrum is to be held in reserve for allocation and assignment beginning after a ten-year period that begins with the submission of this Plan. The remaining spectrum is to be allocated and assigned gradually over the course of the ten-year period.

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[3] 47 U.S.C. § 923.

[4] The public now has direct access to 10 MHz for unlicensed PCS devices and to 15 MHz for continued use under Part 15 rules; 25 MHz will serve the new General Wireless Communications Service, for which licenses will be auctioned at a later time. See Table II-1 and paras. 20 and 21.

[5] 47 U.S.C. § 925(b).

[6] Id.

12. The Budget Act also directed attention to the requirement for appropriate provisions to ensure the availability of frequencies for new technologies and services and for the stimulation of new technology development. Similarly, appropriate provisions for safety of life and property are required.

13. Congress did not intend for the processing of the transferred Government spectrum over the ten-year time period to be independent of existing and future FCC actions for spectrum already under its jurisdiction. Especially with respect to the efficient use of the spectrum, feasibility of allocations other than the transferred spectrum would continue to be addressed, as would innovations and marketplace developments that may affect spectrum efficiencies. However, the statute specifically stated that the Plan shall "not prevent the Commission from allocating frequencies, and assigning licenses to use frequencies, not included in the plan." Finally, the Plan is not viewed as immutable, but in fact seen as evolving in future proceedings.[7]

14. The basic approach is to plan a series of rule makings for the allocation and assignment of the remaining frequencies and to identify the scope and the time frames of the proceedings, consistent with the timetable for the release of the spectrum for private sector use and other mandates. Section II gives a brief background of the Spectrum Plan and the early steps in the transfer process. Section III describes the spectrum that is identified for transfer and focuses on aspects of the transferred spectrum that might affect its uses, such as required shared use. Spectrum Plan details on the future proceedings are identified and scheduled in Section IV, and Section V cites other requirements.

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[7] 47 U.S.C. § 925(b).

II. BACKGROUND

15. The Reallocation Process. The Budget Act, signed into law by Congress on August 10, 1993, requires that the Secretary of Commerce identify at least 200 megahertz of spectrum currently allocated for use by Federal Government agencies, for transfer to the FCC for use by the private sector.[8] All of the 200 megahertz of spectrum recommended for reallocation must be located below 5 gigahertz, with at least 100 megahertz of this being below 3 gigahertz. The Budget Act permits up to 100 megahertz of the spectrum recommended for reallocation to be retained for some use by Federal Government stations provided that the Government use is limited to substantially less than the potential use to be made by non-Government stations (This would be considered "mixed use" spectrum).[9] The Budget Act required that the Secretary of Commerce issue a report within six months of the date of its enactment that makes a preliminary identification of reallocable bands of frequencies that meet criteria established by the Act. The Budget Act further requires the Secretary of Commerce to identify 50 megahertz of the 200 megahertz of spectrum that can be made available for reallocation immediately upon issuance of the Preliminary Report.[10] At least one-half of the 50 megahertz identified for immediate reallocation must be below 3 gigahertz and all of it must be identified for exclusive non-Government use. The President must withdraw the assignment to a Federal Government station of any frequency recommended for immediate reallocation within six months of release of the preliminary report (by August 10, 1994) so that the spectrum is then available for exclusive non-Government use.[11]

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[8] The Communications Act of 1934 authorized the FCC to assign frequencies to all radio stations in the United States except those belonging to the Federal Government. Use of the term "private sector" refers to commercial entities, private entities, local governments, and public safety organizations. Section 305 of the Communications Act, 47 U.S.C. § 305, authorizes the President to assign frequencies to Federal Government stations. This authority has been delegated to the Assistant Secretary of Commerce for Communications and Information (who is also the Administrator of the National Telecommunications and Information Administration). See Pub. Law 102-538, 106 Stat. 3533 (1992) and Executive Order 12046.

[9] 47 U.S.C. § 923(b).

[10] 47 U.S.C § 923(e)(2)(A).

[11] The Budget Act contains a provision whereby the President can substitute alternative frequencies if he determines that: 1) the reassignment would jeopardize the national defense interests, 2) the frequency proposed for reassignment is uniquely suited to meeting important governmental needs, 3) the reassignment would seriously jeopardize health or safety, 4) the reassignment will result in costs in costs the Federal Government that are excessive in relation

16. In accordance with the timing requirements of the Budget Act, on February 10, 1994, the U.S. Department of Commerce released its report making a preliminary identification of spectrum for reallocation.[12] The Preliminary Report identified exactly 200 megahertz of spectrum for reallocation and provided a timeline for making each frequency band available for non-government use and set forth certain conditions on use of each band.

17. The Budget Act provided a 90-day period from the release of the Preliminary Report during which interested parties could file comments with the Secretary of Commerce regarding the report and its recommendations. That 90-day period ended May 11, 1994. A total of 51 comments were filed, copies of which were provided to the FCC by the Department of Commerce. The Commission reviewed these comments and submitted recommendations and analysis to the Secretary of Commerce on February 10, 1995, within the required 90-day period. In its report, the Commission concluded that the frequency bands identified in the Preliminary Report provide a foundation for providing useful spectrum for use by the private sector, but that some changes to the preliminary plan would greatly increase the benefit to the public.[13] The Commission therefore recommended that (1) the preliminary plan be modified to include spectrum below 1 GHz, (2) larger blocks of spectrum be identified, (3) the spectrum be made available earlier. In addition, the Commission recommended that steps be taken to ensure that reallocated spectrum, including shared bands, be available as early as possible in major urban areas where congestion in bands currently available for non-government use is greatest. The Commission provided an example of a reallocation plan that it believed would provide greater benefit to the public. The Commission's example would have reallocated of a total of 335 megahertz of spectrum.

18. After considering the written public comments, input from open public meetings, comments and recommendations of the FCC, and comments from Federal Government spectrum users, the Department of Commerce released a report on March 22, 1995, with final recommendations for bands of spectrum to be reallocated. The Final Report identifies 235 megahertz for reallocation, including the 50 megahertz identified in the Preliminary Report for immediate reallocation. The bands identified in the Final Report, with dates when each band will be available for non-government use, are shown in Table 1. In addition, NTIA indicated that it was also considering accommodation of non-Government services in several other bands, including 225-400 MHz, 3625-3650 MHz, and 5850-5925 MHz, in the future.

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to the benefits that may be obtained from commercial or other non-Federal uses, or 5) the reassignment will disrupt the existing use of a Federal Government band of frequencies by amateur radio licensees. See 47 U.S.C. § 924.

[12] Preliminary Spectrum Reallocation Report, U.S. Department of Commerce, NTIA Special Publication 94-27, February, 1994 (Preliminary Report).

[13] Report to Ronald H. Brown Secretary, U.S. Department of Commerce Regarding the Preliminary Spectrum Reallocation Report, released August 9, 1994, FCC 94-213.

Table II-1
NTIA Preliminary Spectrum Reallocation Plan

Bands for Reallocation	Amount (MHz)	Reallocation Status	Availability
1390-1400 MHz	10	Non-Government only	January 1999
1427-1432 MHz	5	Non-Government only	January 1999
1670-1675 MHz	5	Mixed use[1]	January 1999
1710-1755 MHz	45	Mixed use[1]	January 2004[2]
2300-2310 MHz	10	Non-Government only	August 1995
2390-2400 MHz	10	Non-Government only	Immediate
2400-2402 MHz	2	Non-Government only	August 1995
2402-2417 MHz	15	Non-Government only	Immediate
2417-2450 MHz	33	Mixed use[1]	August 1995
3650-3700 MHz	50	Mixed use[1]	January 1999
4635-4660 MHz	25	Non-Government only	January 1997
4660-4685 MHz	25	Non-Government only	Immediate
Total	235		

[1] Partially retained for use by Federal Government stations provided that such use is substantially less than potential non-Government use.

[2] The Department of Commerce included a provision that could make this band available in the 25 largest cities as early as January 1999 provided that legislation would be approved to permit Federal Government users to receive reimbursement for relocation of their communications systems, including direct reimbursement from the private sector.

19. Finally the Budget Act requires that the Commission shall, "not later than 1 year after receipt of the (Final Report), prepare, submit to the President and Congress, and implement, a plan for the allocation and assignment under the 1934 Act of such frequencies." The instant plan satisfies this requirement.

20. The First 50 Megahertz. As required by the Budget Act, the Department of Commerce, in its Preliminary Report, identified 50 megahertz of spectrum to be made available for reallocation immediately upon issuance of the Preliminary Report.[14] Also, as required, at least one-half of the 50 megahertz identified for immediate reallocation is below 3 gigahertz and all of it is identified for exclusive non-Government use. The 50 megahertz of spectrum identified was in three frequency bands, 2390-2400 MHz, 2402-2417 MHz, and 4660-4685 MHz, and has been transferred for private sector use.[15] The Budget Act required that the Commission allocate, and propose regulations to assign the 50 megahertz of spectrum that is immediately available no later than 18 months after its enactment (i.e., by February 10, 1995).[16]

21. On May 4, 1994, the Commission released a Notice of Inquiry (NOI) in this proceeding seeking information on potential applications for the 50 megahertz of spectrum that has been transferred from Federal Government use.[17] Following this, we released a Notice of Proposed Rule Making (NPRM) on November 8, 1994, proposing that all 50 megahertz of the transferred spectrum for allocated to fixed and mobile services.[18] The Commission subsequently adopted a First Report and Order and Second Notice of Proposed Rule Making on February 7, 1995.[19] In the Order, we allocated the 2390-2400 MHz band for use by unlicensed Personal Communications Services (PCS) devices, provided for continued use of the 2402-2417 MHz band by devices operating in accordance with Part 15 of our Rules, upgraded the domestic allocation of both of these bands for use by the amateur service from secondary to primary, and allocated the 4660-4685 MHz band for use by the fixed and mobile services. The Second NPRM proposed to designate the 4660-4685 MHz band for use by a new General Wireless Communications Service (GWCS). On July 31, 1995, we took

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[14] 47 U.S.C § 923(e)(2)(A).

[15] By letter dated October 27, 1994, the President of the United States notified the Chairman of the Commission that Federal Government frequency assignments in these bands have been withdrawn and that the National Table of Frequency Allocations has been modified to reflect the reallocation of these bands.

[16] 47 U.S.C. § 925(a).

[17] Notice of Inquiry, 9 FCC Rcd 2175 (1994).

[18] Notice of Proposed Rule Making, ET Docket No. 94-32, 9 FCC Rcd 6779 (1994).

[19] First Report and Order and Second Notice of Proposed Rule Making, Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, ET Docket No., 94-32, FCC 95-47, released February 17, 1995 (Order and Second NPRM), 10 FCC Rcd 4769 (1995).

action on our proposals for use of the 4660-4685 MHz band when we adopted a Second Report and Order in ET Docket No. 94-32 creating the GWCS and adopting auction rules for licensing the spectrum at 4660-4685 MHz.[20] We have not yet accepted applications for this service.

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[20] Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, Second Report and Order, ET Docket No. 94-32, released August 2, 1995, 11 FCC Rcd 624 (1995). Reconsideration Pending.

III. SPECTRUM IDENTIFIED FOR REALLOCATION

22. There are a number of factors that affect the suitability of the frequency bands identified for reallocation for non-Government services. This will necessarily shape what services these bands will be used for and how these services are implemented. Such factors include existing non-Government use of some bands, adjacent channel uses, and co-channel Government operations that will remain in some bands. As discussed previously, the Budget Act allowed up to 100 megahertz of the spectrum identified to be for mixed Government and non-Government uses, provided that "the assignments of the band to Federal Government stations under Section 305 of the 1934 Act (47 U.S.C. § 305) are limited by geographic area, by time, or by other means so as to guarantee that the potential use to be made by such Federal Government stations is substantially less (as measured by geographic area, time, or otherwise) than the potential use to be made by non-Federal stations." The following section discusses the factors that could potentially affect non-Government use of reallocated bands, including international and domestic allocations and current adjacent and co-channel uses, and limitations these factors may impose on potential uses.

1390-1400 MHz

23. The 1390-1400 MHz band is allocated in Region 2 to the Radiolocation service on a primary basis and to the Space Research and Earth Exploration-Satellite services for passive use on a secondary basis. Domestically, the band is allocated for use on a primary basis by Government Radiolocation, Fixed, Mobile, Fixed Satellite, and Mobile Satellite services and on a secondary basis for both Government and Non-Government passive Space Research and Earth Exploration-Satellite services. The 10 megahertz of spectrum being reallocated for private sector use is part of the larger 1350-1400 MHz band. In its Final Report, the Department of Commerce states that the 1350-1400 MHz band is used primarily for military radiolocation systems. These include Navy shipborne radar, and extensive Air Force and Federal Aviation Administration radar networks.[21] According to the Final Report, the existing radar systems will be retuned and otherwise modified to eliminate use of the 1390-1400 MHz portion of their operating band. In addition to these radar systems the Army operates tactical transportable radio relay systems. These systems will be modified to eliminate use of the 1390-1400 MHz portion of their operating range.[22] This band is also important for radio astronomy use because of the hydrogen spectral line located at 1420.4 MHz. As described in the Preliminary Report, shifts in this spectral line caused by the

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[21] Final Report at 3-10, 4-3

[22] Final Report at 4-3.

motion of celestial bodies (in this case red-shifted) results in most of the signals received from distant galaxies falling into the 1350-1400 MHz band.[23]

24. Although the Department of Commerce has indicated that this band will be available for exclusive use by the private sector in January, 1999, the Final Report states that Government operations will continue at 17 areas for 14 years.[24] Government operations will operate within 80 km of a given set of coordinates as shown in Table III-1. The continued operation of these Government operations for such an extended period of time could impair the ability of the private sector to use this band to the greatest advantage. The 1390-1400 MHz is located between the frequency bands used by the cellular radio service and the personal communications service. The band has favorable propagation characteristics for mobile communications and, despite the relatively small amount of spectrum, it is likely that this band could prove useful for accommodation of new services. However, a number of the 17 Government operating areas that will remain encompass or are immediately adjacent to major urban markets, including Washington, Baltimore, Philadelphia, and Los Angeles. These major markets are where the demand for spectrum is greatest and precluding private sector use of these large population areas could raise the cost of equipment for this band and limit the types and extent of services provided. The problem is compounded because it is likely that there will necessarily be a large coordination zone around these 17 areas, similar to the coordination zones required around microwave systems located in the 1850-1990 MHz band now being licensed for PCS.[25] In this case, however, the existing use is military, and detailed information on such use may not be publicly available. Accordingly, it may be difficult to coordinate private sector use within several hundred kilometers of the 17 areas. The areas identified for continued Government operations and their associated coordination zones are shown in Figure III-1.[26] While it may be possible, depending on the type of operation, to implement some non-Government systems within the coordination zones, it is likely that use within portions of these areas will be constrained until Government use is discontinued. A potential application that may facilitate shared use with Government systems would be for systems that use dynamic channel selection to avoid causing interference to and interfering with Government systems. In many instances, Government use may occupy only a small portion of the available spectrum for a limited amount of time. Accordingly, dynamic

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[23] Preliminary Report at 4-12.

[24] Final Report at 4-4,5.

[25] See discussion for 1710-1755 MHz.

[26] The coordination zones depicted in Figure III-1 extend 400 km from the edge of each of the Federal Government areas of operation. The 400 km distance assumes relatively high power and antenna height non-Government systems and high power, high height Government systems. Actual Government use within these areas and implementation of lower power, lower height non-Government systems could significantly reduce these coordination zones.

channel selection could provide greater potential use of this band in areas around continued Government operations.

TABLE III-1
Sites at which Government operations will continue for 14 years in the 1390-1400 MHz band

Location	Coordinates	Operating Radius (km)
Eglin AFB, FL	30°28'N, 86°31'W	80
Dugway Proving Grounds, UT	40°11'N, 112°53'W	80
China Lake, CA	35°41'N, 117°41'W	80
Edwards AFB, CA	34°54'N, 117°53'W	80
Ft. Huachuca, AZ	31°33'N, 110°18'W	80
Cherry Point, NC	34°57'N, 76°56'W	80
Patuxent River, MD	38°17'N, 76°25'W	80
Aberdeen Proving Ground, MD	39°29'N, 76°08'W	80
Wright-Patterson AFB, OH	39°50'N, 84°03'W	80
Ft. Greely, AK	63°47'N, 145°52'W	80
Ft. Rucker, AL	31°13'N, 85°49'W	80
Redstone, AL	34°35'N, 86°35'W	80
Utah Test Range, UT	40°57'N, 113°05'W	80
White Sands Missile Range, NM	32°10'N, 106°21'W	80
Holloman AFB, NM	33°29'N, 106°50'W	80
Yuma, AZ	32°29'N, 114°20'W	80
Pacific Missile Rnage, CA	34°07'N, 119°30'W	80

25. In addition to continued co-channel use by the Federal Government precluding private sector use in 17 areas for 14 years, the presence of high power military radar systems in the lower adjacent band is likely to cause adjacent channel interference that will impede private sector use throughout the country. In its Final Report the Department of Commerce recommends adoption of receiver selectivity and transmitter emission standards to help non-

Government users overcome this potential adjacent channel interference. Any private sector equipment manufacturers will have to design their systems in a manner that reduces the potential for adjacent channel interference. Such design will likely require substantial filtering in receivers to eliminate the effects of out-of-band signals and with greater selectivity to minimize the possibility of overloading the receiver front end. If Government and non-Government systems are to co-exist in these adjacent bands, however, it may also be necessary for Government agencies to aggressively filter spurious emissions from radar systems to help eliminate the potential for radiated interference, for which receiver filtering will be ineffective.

26. As discussed above, this band is important for radio astronomy operations because of the presence of the red-shifted hydrogen spectral line that occurs in this band. Although these radio astronomy observations are conducted on an unprotected basis, footnote US311 specifies that, "[e]very practical effort will be made to avoid the assignment of frequencies in the band 1350-1400 MHz to stations in the fixed and mobile services which could interfere with radio astronomy observations" in the areas shown in Table III-2.[27] International Footnote 718 also urges that all practical steps be taken to protect radio astronomy spectral line observations in this band and notes that emissions from space or airborne stations can be particularly serious sources of interference. Accordingly, NTIA recommends that no space-to-Earth links or airborne uses be permitted in this band. Out-of-band and spurious emissions will also have to be controlled to protect the Radio Astronomy service which operates on a primary basis in the 1400-1427 MHz band, and is used for observation of the unshifted hydrogen spectral line.

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[27] See 47 C.F.R. § 2.106 for U.S. and International footnotes.

Table III-2

Radio Astronomy Observatory Areas

National Astronomy and Ionosphere Center Arecibo, Puerto Rico	Rectangle between latitudes 17°30'N and 19°00'N and between longitudes 65°10'W and 68°00'W.	
National Radio Astronomy Observatory Socorro, New Mexico	Rectangle between latitudes 32°30'N and 35°30'N and between longitudes 106°00'W and 109°00'W.	
National Radio Astronomy Observatory Green Bank, West Virginia	Rectangle between latitudes 37°30'N and 39°15'N and between longitudes 78°30'W and 80°30'W.	
National Radio Astronomy Observatory Very Long Baseline Array Stations	80 kilometer (50 mile) radius centered on:	
	Latitude (North)	Longitude (West)
Pie Town, NM	34°18'	108°07'
Kitt Peak, AZ	31°57'	111°37'
Los Alamos, NM	35°47'	106°15'
Fort Davis, TX	30°38'	103°57'
North Liberty, IA	41°46'	91°34'
Brewster, WA	48°08'	119°41'
Owens Valley, CA	37°14'	118°17'
Saint Croix, VI	17°46'	64°35'
Mauna Kea, HI	19°48'	155°27'
Hancock, NH	42°56'	71°59'

1427-1432 MHz

27. The 1427-1432 MHz band is allocated in Region 2 for primary use by fixed and mobile services; the mobile service in the 1427-1429 MHz portion excludes aeronautical mobile use. The 1427-1429 MHz portion also includes a primary allocation to the space operation service for Earth-to-space links. Domestically, the band is similarly allocated for use on a primary basis by the Federal Government for the fixed and mobile services excluding aeronautical use in the 1427-1429 MHz portion. The 1427-1429 MHz portion is allocated for use on a primary basis by both Government and non-Government systems in the space operation service for Earth-to-space links. The entire 1427-1432 MHz band is also allocated for non-Government use on a secondary basis for fixed telemetering, and land mobile telemetering use. The preliminary report states that fixed use of this band is primarily for proficiency training using tactical radio relay systems and that mobile use is primarily air-to-

ground and ground-to-air telecommand links for operational and testing programs at military electronic test ranges.[28]

28. Although the band is scheduled to be available for exclusive non-Government use in January 1999, Federal Government users intend to continue operations within 14 areas with radii ranging from 70 to 160 kilometers until 2004. As with the 1390-1400 MHz band, a number of the areas identified for extended continued Federal operation encompass or are adjacent to major metropolitan areas and will likely significantly impair the ability of the private sector to implement services in the band until the cessation of Federal operations. Since Government operations will be carried out throughout the 14 operating areas identified in Table III-3, including airborne telemetering operations, it may not be possible for non-Government operations to operate reliably for several hundred kilometers from the edges of the Government areas of operation. This situation is analogous to the one at 1390-1400 MHz and, again, depending on the type on non-Government use, it may be possible to implement non-Government systems within the coordination zones. However, use of airborne mobile stations may extend the necessary coordination zone considerably, further limiting non-Government use. Figure III-2, shows the Government operating areas and the coordination zones based on the PCS model.[29] As can be seen, such continued Government operations limit or may even eliminate coverage of most major metropolitan areas until the year 2004. As with the 1390-1400 MHz band, however, the ability to implement non-Government systems with these coordination zones will depend greatly on the type of non-Government operations as well as the actual Government use within each of the areas.

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[28] Preliminary Report at 4-26.

[29] See TIA Bulletin 10-F.

TABLE III-3

Sites at which Government operations will continue for 9 years in the 1427-1432 MHz band

Location	Coordinates	Operating Radius (km)
Patuxent River, MD	38°17'N, 76°24'W	70
NAS Oceana, VA	36°49'N, 76°02'W	100
MCAS Cherry Point, NC	34°54'N, 76°52'W	100
Beaufort MCAS, SC	32°26'N, 80°40'W	160
NAS Cecil Field, FL	30°13'N, 81°52'W	160
NAS Widbey Is., WA	48°19'N, 122°24'W	70
Yakima Firing Ctr. AAF,WA	46°40'N, 120°15'W	70
Mountain Home AFB, ID	43°01'N, 115°50'W	160
NAS Fallon, NV	39°24'N, 118°43'W	100
Nellis AFB, NV	36°14'N, 115°02'W	100
NAS Lemore, CA	36°18'N, 119°47'W	120
MCAS Twenty Nine Palms, CA	34°15'N, 116°03'W	80
China Lake, CA	35°29'N, 117°16'W	80
Yuma MCAS, AZ	32°39'N, 114°35'W	160

29. The radio astronomy service operates on a primary basis on the lower band adjacent to the 1427-1432 MHz band. As described in the discussion of the 1390-1400 MHz band, the 1400-1427 MHz band is important for radio astronomy use primarily because of the hydrogen spectral line which occurs there. The systems used to detect this spectral line, which is used to map the distribution and motion of mass in the Universe, are passive and use extremely sensitive receivers. Accordingly, out-of-band and spurious emissions, and the type of non-Government service will need to be limited to ensure that new services at 1427-1432 MHz do not unduly disrupt radio astronomy operations in the lower adjacent band. Thus NTIA recommends that 1427-1432 MHz not be used for airborne or space-to-Earth links.[30]

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[30] Preliminary Report at 4-26, Final Report at 4-6.

1670-1675 MHz

30. This band is allocated world-wide for primary use by the fixed, meteorological aids, meteorological-satellite, and mobile services. At the 1992 World Administrative Radio Conference, this band was identified for use by administrations desiring to implement an aeronautical public correspondence service. In the U.S., however, this service has been implemented in the 900 MHz band and there has been no intention of reallocating the service. The 1670-1675 MHz band is allocated domestically for use by both Government and non-Government users on a primary basis for meteorological aids (radiosondes), and meteorological-satellite (space-to-Earth) services. This band is currently used in the U.S. for weather prediction in the meteorological aids service through the use of radiosondes, a weather sensing instrument carried on a balloon or parachute that automatically transmits weather information. It is also used for space-to-Earth links for the National Oceanographic and Atmospheric Administration's Geosynchronous Operational Environmental Satellite (GOES) system.

31. This band is scheduled to be available for non-Government use in January 1999. The band will be used on a mixed Government and non-Government basis.[31] Radiosonde equipment will be redesigned so that it no longer operates in this band; however, Earth stations for NOAA's GOES system will continue, and the receive sites at Wallops Island, Virginia and Fairbanks, Alaska will need to be protected. Appendix C of the Final Report provides information on protection criteria for the two METSAT earth stations. This appendix specifies that, 1) the cumulative interference at the receiver input in any 1 kilohertz band can be no higher than 10 dB below the receiver thermal noise power (given as -182 dBW) in that band for 99.99 percent of the time during any one-month period, and 2) the cumulative interference at the receiver input in any 1 hertz band can be no higher than the receiver thermal noise power (given as -212 dBW) in that band for 99.99 percent of the time during any one month period. Appendix C specifies a receiver antenna pointed at the geosynchronous arc between 75 W and 135 W longitude, with an assumed gain of 49 dBi.

32. The 1670-1675 MHz is adjacent to the 1660-1670 MHz band which is allocated on a primary basis for radio astronomy use. The two spectral lines of the hydroxyl radical fall within this band at 1665.402 and 1667.359 MHz. Observation of these spectral lines is important for understanding interstellar medium and star formation in other galaxies. Radio astronomy operations are carried out through passive observation with highly sensitive receivers. Consideration to this adjacent channel service must be given when determining

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[31] NTIA states that immediate shared use of this band is feasible provided that protection is afforded to all Government systems, including radiosondes, until 1999. The Appendix C of the Final Report provides details of necessary protection criteria.

non-Government uses of the 1670-1675 MHz band. NTIA recommends that the band not be used for airborne or space-to-Earth links.[32]

1710-1755 MHz

33. The 1710-1755 MHz band is allocated internationally to the fixed and mobile services. The segment from 1718.8-1722.2 MHz is allocated for secondary use by the radio astronomy service. Footnote 744 urges administrations to consider this secondary allocation when making assignments, and states that airborne or space-to-Earth links can be particularly destructive. Footnote 745 permits use of 1710-1755 MHz by the space operation and space research services in the Earth-to-space direction in Region 2. Domestically, 1710-1755 MHz is allocated on a primary basis for Government fixed and mobile services. The band is a portion of the Government's primary fixed service band, which extends from 1710-1850 MHz. This band is used by many Government agencies to support a wide variety of services, is considered the predominant Federal medium-capacity line-of-sight fixed service band, and is used for voice, data, and/or video communications. Fixed operations in the 1710-1755 MHz band segment include national defense, law enforcement, provision of navigation services to ships and planes, management of public forests and parks, military command and control communications, tactical and air combat training, natural disaster response and recovery operations, and the control links for wide-area networks for various power, land and water management systems.[33] In addition, the band is used by the military for tactical radio relay activities, and for airborne telemetry used for control of guided weapon missile systems.

34. The frequency band 1710-1755 MHz is scheduled to be available for mixed Government and non-Government use in January 2004. Recognizing the need for spectrum in major urban areas, NTIA, in the Final Report, states that the band could be available in the 25 largest cities as early as January 1999, provided that Federal agencies receive compensation for displaced systems.[34] One method of reimbursing Federal agencies would be to create a structure similar to that used in relocating non-Government microwave systems from the 1850-1990 MHz band allocated for personal communications services.[35] That is, new non-Government licensees would pay the cost of relocating Government systems to comparable facilities as required. Such an arrangement would, however, require a change in the law,

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[32] Final Report at 4-8.

[33] Final Report at 4-8.

[34] Final Report 4-10.

[35] Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, Third Report and Order and Memorandum Opinion and Order, ET Docket No. 92-9, 8 FCC Rcd 6589 (1993).

which currently requires Federal agencies receiving non-appropriated funds to deposit the funds in the general appropriations account of the U.S. Treasury rather than keeping the funds for use by the agency. Further, successful implementation of such an arrangement would require a change in the appropriations and acquisition procedures of Federal agencies. As described by the Final Report the current procedures result in an 8-year cycle before new equipment can be in place for use. Agencies state that speeding the appropriation and acquisition cycle will require relaxation of the Federal Information Resource Management Regulations and Federal Acquisition Regulations.[36]

35. Regardless of whether the necessary legislative changes can be enacted to facilitate clearing Federal microwave systems that operate within 150 km of the 25 largest cities by 1999, it is not apparent that the 1710-1755 MHz band will be useful for a variety of new non-Government services in many of these areas. The Final Report delineates 16 areas with radii ranging from 50 to 160 km in which Government operations will continue indefinitely. A number of these areas are immediately adjacent to major urban areas, including some of the 25 largest cities as identified in the Final Report. In several instances, these areas are within 150 km of the 25 largest cities and the potential for non-Government use in these areas could be limited. Affected cities that are so directly effected include Los Angeles, Washington, D.C, Baltimore, Seattle, and New Orleans.

36. The situation is further complicated by considering the protection requirements of Government systems. Figure F-3 of the Final Report identifies the 16 areas where Government operations are to continue on a primary basis as areas where Federal fixed microwave, tactical radio relay, and aeronautical mobile stations will be retained indefinitely. Because a specific non-Government use for this band has not yet been identified, it is not possible to do an in-depth interference analysis between Government and non-Government systems. However, it is reasonable to view the instant situation as roughly analogous to the situation that exists in the 1850-1990 MHz band where PCS systems are beginning to replace fixed microwave systems. To facilitate this transition the Commission relies on coordination and interference analysis developed on a voluntary basis by the private sector. In accordance with procedures established by the National Spectrum Managers Association (NSMA) and the Telecommunications Industry Association (TIA), the coordination zone along the main beam of the antenna of a fixed microwave system is 400 km, coordination outside of the main beam is 200 km.[37] A PCS licensee that wants to construct a transmitter within this coordination zone must consider the possibility of interference to and from the fixed microwave system. Interference calculations are performed using industry recognized standards, such as one developed by the Telecommunications Industry Association and described in TIA Technical Service Bulletin 10 F.

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[36] Final Report at 4-10.

[37] NSMA recommendations, WG3.90.026 and TIA Bulletin 10-F, annex F.

37. In the instant case, because the Government systems in question include portable tactical radio relay systems and aeronautical mobile stations that may operate anywhere within the 16 areas identified in the Final Report, it is reasonable to conclude that the 400 km coordination zone should be measured from the outer edges of the 16 areas. The situation is depicted graphically in Figure III-3 which shows that the coordination zones encompass the majority of the East and West coasts of the U.S. and extend considerably far inland. These are coordination zones, not exclusion zones, and it may possible to implement non-Government systems within large portions of these zones, especially in areas where transportable tactical microwave systems operate at lower power and antenna heights compared to many permanent microwave systems. However, since a number of the 16 areas are immediately adjacent to major metropolitan areas, the possibility of accessing this spectrum in the areas where spectrum is most needed is not evident. This is especially true when we consider the presence of aeronautical mobile stations in some of these areas. While low power, low height tactical relay systems will decrease the necessary coordination zone, the presence of aeronautical mobile stations, with their much greater antenna height, could extend the coordination zone or result in lower potential for actual use within a coordination zone. Thus, it must be concluded that a general mobile communications service, such as PCS, could not be implemented in large portions of the most populated areas of the country unless a satisfactory method for coordinating Government and non-Government operations can be established.

TABLE III-4

Sites at which Government operations will continue for indefinitely in the 1710-1755 MHz band

Location	Coordinates	Operating Radius (km)
Eglin AFB, FL	30°29'N, 86°31'W	120
Pacific Missile Test Range, CA	34°07'N, 119°30'W	80
China Lake, CA	35°41'N, 117°41'W	120
Nellis AFB, NV	36°14'N, 115°02'W	160
Hill AFB, UT	41°08'N, 115°58'W	160
Cherry Point, NC	34°58'N, 76°56'W	100
Patuxent River, MD	38°17'N, 76°25'W	80
Ft. Irwin, CA	35°19'N, 116°41'W	50
Ft. Bragg, NC	35°09'N, 79°01'W	50
Ft. Campbell, KY	36°41'N, 87°28'W	50
Ft. Rucker, AL	31°13'N, 85°49'W	50

Ft. Lewis, WA	47°05'N, 122°36'W	50
Ft. Benning, GA	32°22'N, 84°56'W	50
Ft. Stewart, NC	31°52'N, 81°37'W	50
Holloman AFB, NM	33°29'N, 106°50'W	80
Yuma, AZ	32°29'N, 114°29'W	120

38. While the 16 areas identified in Figure F-3 of the Final Report present the greatest challenge to implementing non-Government services in this band, they are not the only obstacle. Appendix E of the Final Report lists 444 Government fixed microwave links that will remain in this band indefinitely. Of these microwave links, 333 are operated by, or support, the operation of Federal power agencies. The Budget Act specifically exempts assignments to Federal power agencies from reallocation to non-Government use. The remaining 111 fixed microwave links identified in Appendix E of the Final Report are systems that are used primarily for safety-of-life communications. The fixed systems listed have bandwidths ranging from 800 kilohertz to 10 megahertz of spectrum. As Appendix B of this plan shows, the systems are scattered throughout the country and throughout the 1710-1755 MHz band. Using the model developed for PCS in the 1850-1990 MHz band, it is evident that these systems will present a considerable obstacle to private sector use of this band. However, none of these links uses the entire 1710-1755 MHz band and it may be possible to implement a non-Government system that dynamically avoids use of affected frequencies.

39. Finally, footnote US256 notes that radio astronomy observations are carried out on an unprotected basis in the 1718.8-1722.2 MHz band to study the 1720.53 MHz spectral line of the hydroxyl radical and encourages users in the geographic areas listed in Table III-5 to minimize potential interference to these operations.

Table III-5
Radio Observatory Areas

Hat Creek Observatory Hat Creek, California	Rectangle between latitudes 40°00'N and 42°00'N and between longitudes 120°15'W and 122°15'W.
Owens Vally Radio Observatory Big Pine, Califonia	Two contiguous rectangles, one between latitudes 36°00'N and 37°00'N and between longitudes 117°40'W and 118°30'W and the second between latitudes 37°00'N and 30°00'N and between longitudes 118°00'W and 118°50'W.
Haystack Radio Observatory Tyngsboro, Massachuesetts	Rectangle between latitudes 41°00'N and 43°00'N and between longitudes 71°00'W and 73°00'W.
National Astronomy and Ionosphere Center Arecibo, Puerto Rico	Rectangle between latitudes 17°30'N and 19°00'N and between longitudes 65°10'W and 68°00'W.
National Astronomy Radio Observatory Green Band, West Virginia	Rectangle between latitudes 37°30'N and 39°15'N and between longitudes 78°30'W and 80°30'W.

40. Because of the amount of Federal Government operations that will remain permanently in this band, it can be concluded that it would be difficult to implement a mobile service similar to PCS that operates throughout the U.S. Alternatively, this band may be suitable for fixed operations, including fixed satellite services, that can be coordinated with existing systems more effectively than can a mobile service.

2300-2310 MHz

41. The 2300-2310 MHz band is allocated in Region 2 for primary use by the fixed, mobile, and radiolocation services, and for use on a secondary basis by the amateur radio service. This band was made available for exclusive non-Government use as of August 10, 1995. Prior to reallocation, the band was allocated for Government use on a primary basis by the radiolocation service and on a secondary use for the fixed and mobile services. As of the date of availability, the table of allocations was modified to eliminate allocations for Government use. Footnote G123 allows government operations to continue but specifies that such use is on a non-interference basis to authorized non-Government operations and that these Government operations shall not hinder the implementation of any non-Government operations. The band 2300-2310 MHz is allocated for non-Government use on a secondary basis by the amateur radio service, although footnote US253 specifies that fixed and mobile services operating in this band shall not cause harmful interference to the amateur service. No modifications have been made to non-Government allocations for this band since it was made available for non-Government use.

42. Potential uses of this band were discussed in our recent proceeding to allocate spectrum transferred from Federal Government use, ET Docket No. 94-32, although action regarding this band was deferred.[38] Comments filed in that proceeding describe current amateur service use of 2300-2310 MHz. The American Radio Relay League, as well as other commenters, report that this band is used for weak signal operation centered on or near 2304.1 MHz. Weak signal operations require the use of highly sensitive receivers and high powered transmitters. A channeling plan submitted by the Southern California Repeater and Remote Base Association shows weak signal operations from 2303.75-2304.75, with the remainder of the 2300-2310 MHz band being paired with the 2390-2400 MHz band for fixed microwave operations. As discussed in the background section of this plan, the Commission, in Docket 94-32, made primary the allocation for the amateur service at 2390-2400 MHz.

43. The Budget Act requires that, in identifying spectrum for transfer to non-Government use, the Secretary, Department of Commerce, shall seek avoid "excessive disruption of existing use of Federal Government frequencies by amateur radio licensees." The Budget Act further requires that, in analyzing the potential for non-Government use of transferred spectrum, the Secretary, Department of Commerce shall consider "the extent to which, in general, commercial users could share the frequency with amateur radio licensees." To this extent, Appendix B of the Final Report provides an analysis of existing amateur service operations and the potential for non-Government services to share with these operations.

44. Sharing between Federal Government users and the amateur service has been successful largely because Federal operations are generally located outside of highly populated areas.[39] It is very unlikely that the amateur service will enjoy an analogous situation with a commercial or other private sector service. If commercial services are to share with the weak signal operations located at 2303.75-2304.75 MHz, they must be able to withstand potential interference from the high-powered transmitters used for those operations, but not create interference to the sensitive receivers used. This is something of a contradiction that tends to point to relatively low power devices that operate over short distances, such as devices authorized under Part 15 of the Commission's Rules, or to operations with a lower density of use that may be located in relatively remote areas. Similar operations should also be compatible with amateur service fixed operations, as would commercial fixed operations that can be coordinated with amateur systems.

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[38] ET Docket No. 94-32, Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, First Report and Order and Second Notice of Proposed Rule Making, Released, February 17, 1995, 10 FCC Rcd 4769.

[39] Southern California Repeater and Remote Base Association comments at 9, filed in response to the Notice of Inquiry in ET Docket No. 94-32.

45. In addition to consideration of sharing with the amateur service in this band, we must also consider the potential for non-Government systems to interfere with Space Research operations conducted in the lower adjacent band at 2290-2300 MHz. NASA operates its Deep Space Network receiver at 2290-2300 MHz, which uses sensitive receivers located at Goldstone, California, to receive very low-level signals. NASA is concerned that unwanted emissions from non-Government operations in the 2300-2310 MHz band will interfere with this system. Consequently, NTIA recommends: (1) that this band not be used for airborne or space-to-Earth links; (2) that commercial operations at 2300-2310 MHz be limited to less than 1 watt of power; (3) that emissions in the band below 2300 MHz be attenuated below the mean power of the unmodulated carrier by -70 dB; (4) and that operation of commercial devices in this band not be permitted on Ft. Irwin, California.

2400-2402 MHz

46. This band is allocated in Region 2 for primary use by the fixed, mobile, and radiolocation services, and for use on a secondary basis by the amateur radio service. It is also part of the 2400-2500 MHz band identified for use by Industrial, Scientific, and Medical (ISM) devices. This band was not identified by NTIA for transfer to non-Government use in its Preliminary Report in order to protect amateur-satellite operations that are currently conducted in this band. However, in the Final Report NTIA concluded, based on comments received, that the two megahertz was insufficient by itself to protect existing amateur-satellite operations and to allow expanded amateur-satellite use in the future and that sharing between the amateur-satellite service and other non-Government applications may be possible.[40] Accordingly, this band was made available for exclusive non-Government use as of August 10, 1995, and the table of allocations was modified to eliminate allocations for Government use. Footnote G123 allows government operations to continue indefinitely but specifies that such use is on a non-interference basis to authorized non-Government operations and that these Government operations shall not hinder the implementation of any non-Government operations. No modifications have been made to non-Government allocations for this band since it was made available for non-Government use. Accordingly, the only remaining domestic allocation for this band is to the amateur service to operate on a secondary basis.

47. Although the amateur service is currently the only allocated service in the 2400-2402 MHz band, there are two other operations in this band that will greatly effect our ability to implement new services here. First, the 2400-2402 MHz band lies within the 2400-2500 MHz band that is available for use by ISM applications.[41] Radio services operating within this band must accept harmful interference that may be caused by ISM devices, which include a large number of microwave ovens commonly used in households. Although emissions from

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[40] Final Report at 4-30 - 4-33.

[41] See Table of Frequency Allocations, 47 C.F.R. § 2.106. See also 47 C.F.R. Part 18.

these devices are generally centered around 2450 MHz, significant emissions are still detected in the 2400-2402 MHz band. The widespread use of ISM devices makes this a very difficult band in which to operate and may be particularly difficult for relatively low-power mobile services covering large areas.

48. Second, the 2400-2483.5 MHz band is available domestically for use by equipment authorized under Part 15 of the Rules.[42] This situation is identical to that for the 2402-2417 MHz band considered in our proceeding to allocate the first 50 megahertz of spectrum transferred from Federal Government use, ET Docket No. 94-32. Many of the comments received in response to the Notice of Proposed Rule Making in that proceeding were filed by manufacturers of Part 15 devices, particularly manufacturers of wireless local area networks (LANs) and devices that interact with wireless LANs.[43] These commenters noted that the Commission encouraged development of unlicensed spread spectrum systems in the 902-928 MHz, 2400-2483.5 MHz, and 5700-5825 MHz bands, and the industry responded by developing a wide variety of products, including digital cordless telephones, electronic article surveillance equipment, utility metering devices, fire and security alarm devices, wireless bar code readers, collision avoidance systems, and wireless LANs. Commenters contended that Part 15 devices provide the kind of spectrum efficient uses, new technologies, and open competitive markets that the Commission is generally trying to promote. The LAN MAN Standards Committee of the IEEE, IEEE 802, and other parties filed comments discussing the work that has gone into developing standards for wireless LANs based on current Part 15 Rules for this band. Commenters noted that 2400-2483.5 MHz is increasingly available internationally for Part 15 type use and it is likely that the IEEE 802 standard will be used internationally. They argue, therefore, that it would undermine the nation's international competitiveness if the Commission adversely affects Part 15 use of the band.

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[42] Part 15 provides for operation of unlicensed low-power devices, 47 C.F.R. Part 15.

[43] See generally Comments of 3Com Corporation (3Com), Advanced Micro Devices, Inc. (AMD), Andrew Corporation (Andrew), Apple Computer, Inc. (Apple), AT&T, Brian Robinson, Cincinnati Microwave, Compaq Computer Corporation (Compaq), Consumer Electronics Group of the Electronics Industries Association (EIA), Cylink Corporation (Cylink), IEEE 802, International Business Machines Corporation (IBM), Metricom, Inc., Microsoft Corporation (Microsoft), Norand Corporation (Norand), Part 15 Coalition, Rockwell International Corp. (Rockwell), Standard Microsystems Corporation (SMC), Symbol Technologies, Inc. (Symbol), Tetherless Access LTD. (TAL), Western Multiplex Corporation (WMC), Windata, Inc., Wireless Information Networks Forum, Inc. (Winforum), Xircom, Inc. and Reply Comments of AMD, Apple, AT&T, Claircom Communications Group, L.P, Compaq, Cylink, Interdigital Communication Corporation, IBM, Micron Communications, Inc., Part 15 Coalition, Metricom, Symbol, Andrew, Proxim, Inc.

2417-2450 MHz

49. As with the 2400-2402 MHz band, the 2417-2450 MHz band is allocated in Region 2 for primary use by the fixed, mobile, and radiolocation services, and for use on a secondary basis by the amateur radio service. It is also part of the 2400-2500 MHz band identified for use by ISM devices. This band was not identified by NTIA for transfer to non-Government use in its Preliminary Report because of the difficulty of operating a radio service in the presence of ISM emissions. However, in the Final Report NTIA concluded that it would be beneficial to transfer this band for non-Government use in order to provide the FCC the opportunity to develop a comprehensive plan for use of the entire 2400-2483.5 MHz band.[44] NTIA also noted, however, that the Department of Defense required continued access to this spectrum at specific locations for limited periods of time in order to continue necessary operations such as radar testing.[45] Accordingly, this band was made available for mixed Government and non-Government use as of August 10, 1995, and the table of allocations was modified to make the Government radiolocation service secondary. Government radiolocation operations are limited to military operations. No modifications have been made to non-Government allocations for this band since it was made available for non-Government use. Accordingly, the only current non-Government allocation for this band is to the amateur service to operate on a secondary basis.

50. While the non-Government column of the table of allocations shows only the secondary amateur service allocation for 2417-2450 MHz, there are two other operations in this band that will greatly effect our ability to implement new services here. As with 2400-2402 MHz discussed in the previous section, the 2417-2450 MHz band lies within the 2400-2500 MHz band that is available for use by ISM applications and any radio services operating within this band must accept harmful interference that may be caused by ISM devices, including a large number of microwave ovens commonly used in households.[46] Emissions from these devices are generally centered around 2450 MHz. Thus this portion of the ISM band experiences the greatest emissions from ISM equipment.[47] The widespread use of ISM devices makes this a very difficult band in which to operate and would be particularly difficult for commercial mobile services covering large areas.

51. Also of particular interest in this band is the large existing investment that has been made in developing equipment used on an unlicensed basis operating in accordance with Part 15 of the Rules. The 2400-2483.5 MHz band is available domestically for use by

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[44] Final Report at 4-33.

[45] Final Report at 4-32.

[46] See Table of Frequency Allocations, 47 C.F.R. § 2.106. See also 47 C.F.R. Part 18.

[47] See Appendix E of the Preliminary Report. Appendix E gives a brief overview of studies that have been performed regarding emissions from microwave ovens.

equipment authorized under Part 15 of the Rules.[48] This situation is identical to that for the 2400-2402 MHz band discussed previously and the 2402-2417 MHz band considered in our proceeding to allocate the first 50 megahertz of spectrum transferred from Federal Government use, ET Docket No. 94-32. These three bands all form a portion of the 2400-2483.5 MHz band available for a variety of unlicensed devices. Equipment that operates under Part 15 includes digital cordless telephones, electronic article surveillance equipment, utility metering devices, fire and security alarm devices, wireless bar code readers, collision avoidance systems, and wireless LANs. Manufacturers of these devices provided extensive comments in ET Docket No. 94-32 regarding the difficulty of sharing the band, not only with the amateur service and ISM devices, but with a commercial or other licensed communication service providing wide-area coverage. The consensus among such manufacturers is that such sharing would not be realistic and that implementation of a licensed service would result in the inability of unlicensed devices to continue operations in this band since such devices must not cause interference to and must accept interference from authorized services.[49]

3650-3700 MHz

52. This band is allocated internationally for use on a primary basis by the fixed and fixed-satellite services and in Region 2 for use on a primary basis by the mobile service except for aeronautical mobile use. It is allocated in Region 2 for use on a secondary basis by the radiolocation service. Domestically, 3650-3700 MHz is allocated for use by the Federal Government on a primary basis by the aeronautical radionavigation service for ground-based operations and on a primary basis by the radiolocation service. The band is also allocated for non-Government use on a primary basis by the fixed-satellite service and on a secondary basis by the radiolocation service. Footnote US245, however, limits use for the fixed-satellite service to international inter-continental systems and subject to a case-by-case interference analysis. In comments to the Preliminary Report, COMSAT stated that it currently uses this band to provide fixed-satellite service as part of the International Telecommunications Satellite Organization (INTELSAT).[50] Presently, the major Government use of this band is by the Navy for shipborne radar.[51]

53. This band is scheduled to be available for mixed Government and non-Government use beginning January 1999. Although use of this band will be shared, the Final Report indicates that Navy radar systems will be modified to operate in the lower adjacent band rather than continuing operation at 3650-3700 MHz. There are, however, three areas

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[48] Part 15 provides for operation of unlicensed low-power devices.

[49] 47 C.F.R. § 15.5.

[50] Comments filed by COMSAT Corporation in response to Preliminary Report.

[51] Preliminary report at 4-17.

shown in Table III-6 where radar operations will continue indefinitely in this band. The Final Report also states that the DOD operates extremely high-powered mobile radar systems in the lower adjacent band. Such adjacent channel use of high-powered radar creates a significant potential for interference to non-Government operations at 3650-3700 MHz and will have to be considered in the design of any equipment for use in this band. NTIA recommends adoption of transmitter emission and receiver selectivity standards for non-Government systems. The presence of these radar systems will have to be a consideration in the design of equipment used for this band and manufacturers will have to take steps to limit the potential interference caused to their equipment. Federal Government users, however, should also take appropriate action to limit out-of-band emissions from radars.

54. As previously stated, this band is allocated for, and is currently used for, non-Government systems in the fixed-satellite service. Non-Government use of this band for fixed-satellite services has been increasing and includes INTELSAT and INMARSAT, and Directsat, Inc. has filed an application to use this band for telemetry, tracking, and control of a direct broadcast satellite. This transfer of Government spectrum may present an opportunity for greater use of this band for non-Government fixed-satellite systems. The Final report also discusses the possibility of obtaining greater non-Government use of an additional 25 megahertz of immediately adjacent spectrum at 3625-3650 MHz depending on discussions between the FCC, NTIA, and DOD. Federal Government agencies have expressed an interest in using commercial satellite systems to meet the satellite communication needs of agencies. They are concerned however because there is currently no fixed-satellite allocation for Government systems. Accordingly, any fixed-satellite Earth stations constructed by agencies operate on a secondary basis to non-Government systems, regardless of which was constructed first. NTIA has therefore expressed an interest in obtaining equal status for Government fixed-satellite Earth stations with non-Government stations. If a compromise can be reached, it may be possible for non-Government systems to obtain greater access to additional spectrum for fixed-satellite use.

55. The 3650-3700 MHz band is also adjacent to the 3700-4200 MHz band, which has been identified for accommodation of fixed microwave systems displaced from the 1850-1990 MHz band by PCS.[52] It is unlikely, however, that this band could provide additional spectrum for reaccommodation of displaced systems since the 50 megahertz available is insufficient to channelize the band in a manner that provides sufficient separation between transmit and receive frequencies.

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[52] Second Report and Order, ET Docket No. 92-9, Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, 8 FCC Rcd 6495 (1993).

TABLE III-6

Sites at which Federal Systems in the 3650-3700 MHz band will be retained indefinitely.

Location	Coordinates	Operating Radius (km)
St. Inigoes, MD	38°10'N, 76°23'W	80
Pascagoula, MS	30°22'N, 88°29'W	80
Memphis, TN	35°03'N, 89°59'W	80

4635-4660 MHz

56. Internationally, 4635-4660 MHz is allocated in Region 2 on a primary basis for fixed, fixed-satellite, and mobile services.[53] This band is allocated domestically on a primary basis for Government systems in the fixed and mobile services and for non-Government space-to-Earth links in the fixed-satellite service, with use limited to international inter-continental systems and subject to a case-by-case electromagnetic compatibility analysis.[54] However, there is currently no non-Government use of this band.[55] This band is part of a much larger band that extends from 4400-4990 MHz that is used for a variety of military fixed and mobile, including aeronautical mobile, communications systems. This portion of the band was selected to take advantage of lighter usage between paired transmit and receive channels.[56]

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[53] See Table of Frequency Allocations, 47 C.F.R. § 2.106. Use of the fixed-satellite service (space-to-earth) at 4500-4800 MHz is subject to an allotment plan contained at Appendix 30B of the international Radio Regulations.

[54] See Table of Frequency Allocations, 47 C.F.R. § 2.106. The fixed-satellite service in this band is also subject to case-by-case electromagnetic compatibility analyses. See U.S. allocation footnote 245.

[55] An agreement with Canada requires that certain United States Government terrestrial line of sight and troposcatter systems be coordinated with Canada. This agreement also permits use of this band by airborne or other mobile stations but requires that such stations protect Canadian systems. See Sharing Arrangement Between the Department of Communications of Canada and the National Telecommunications and Information Administration of the United States Concerning the Use of the Band 4400-5000 MHz, signed August 29, 1986.

[56] Final Report at 4-22.

57. The frequency band 4635-4660 MHz has been identified to be available in January 1997 for exclusive use by non-Government systems except that in three areas with radii of 80 km airborne communications systems will continue to operate for 15 years. As shown in figure III-4, two of these areas are located outside of the continental United States in Puerto Rico, and the U.S. Virgin Islands. One site, however, is located in Virginia and may impede the use of this band in several major metropolitan areas. As discussed in regard to several of the other bands, we believe it reasonable to assume a 400 km coordination zone around each of these areas. As shown in figure III-4, the coordination zone for the site in Virginia encompasses Washington, D.C., Baltimore, Philadelphia, and portions of New York City. Since we have not yet determined what types of non-Government systems will occupy this band, and have very little information about the Government's use in the three areas, it is not possible at this time to determine accurately the potential for interference to and from Government systems in these coordination zones. It may therefore be possible to implement non-Government systems within at least portions of these zones. The Government systems in question are airborne, however, and may limit non-Government use more than would a terrestrial system.

TABLE III-7

Sites at which Federal Airborne Operations in the 4635-4660 MHz band will continue for 14 years.

Location	Coordinates	Operating Radius (km)
Pico Del Este, PR	18°16'N, 65°46'W	80
Dam Neck, VA	36°46'N, 75°57'W	80
St. Thomas, VI	18°21'N, 64°55'W	80

58. This band is immediately adjacent to the 4660-4685 MHz band that has already been transferred from Government to non-Government use. The 4660-4685 MHz band was allocated to the fixed and mobile services in ET Docket No. 94-32 to be used for the General Wireless Communications Service (GWCS). This service is structured to provide a great deal of flexibility in order to allow licensees sufficient opportunity to meet the spectrum needs of customers. Licensees can, therefore, provide almost any fixed or mobile service, including dispatch services, point-to-point microwave, aeronautical audio/visual service, wireless local loop service, and terrestrial fixed and mobile auxiliary broadcast operations. Because of the uncertainly as to exactly how a licensee will use its spectrum, if a similar service is implemented at 4635-4660 MHz we will have to evaluate the need for additional constraints in the vicinity of the three areas where Government operations will continue.

Figure III-1

Sites at which Federal operations in the 1390-1400 MHz band will be continued for 14 years (2009).

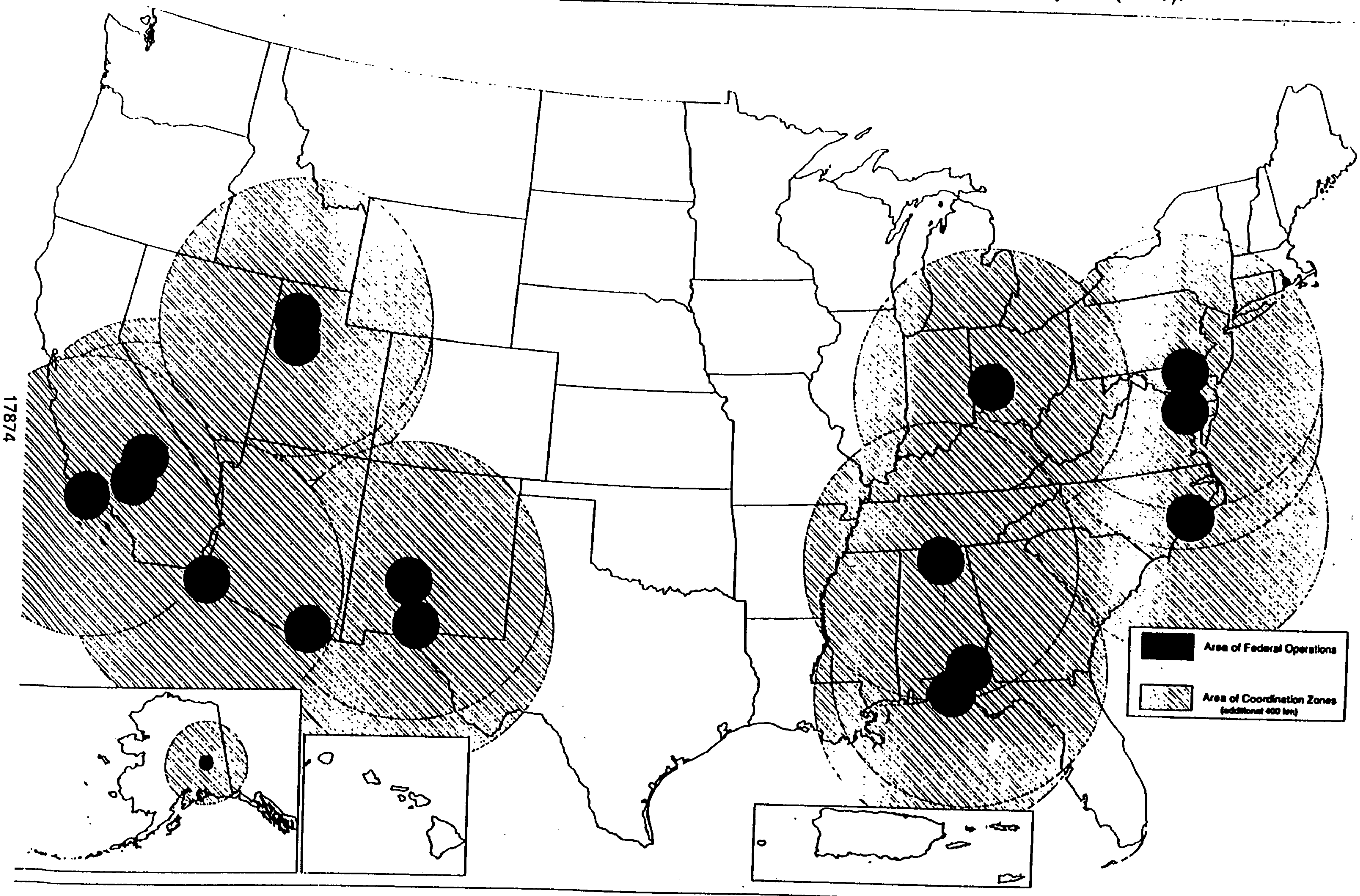


Figure III-2

Sites at which Federal operations in the 1427-1432 MHz band will be continued for nine years (2004).

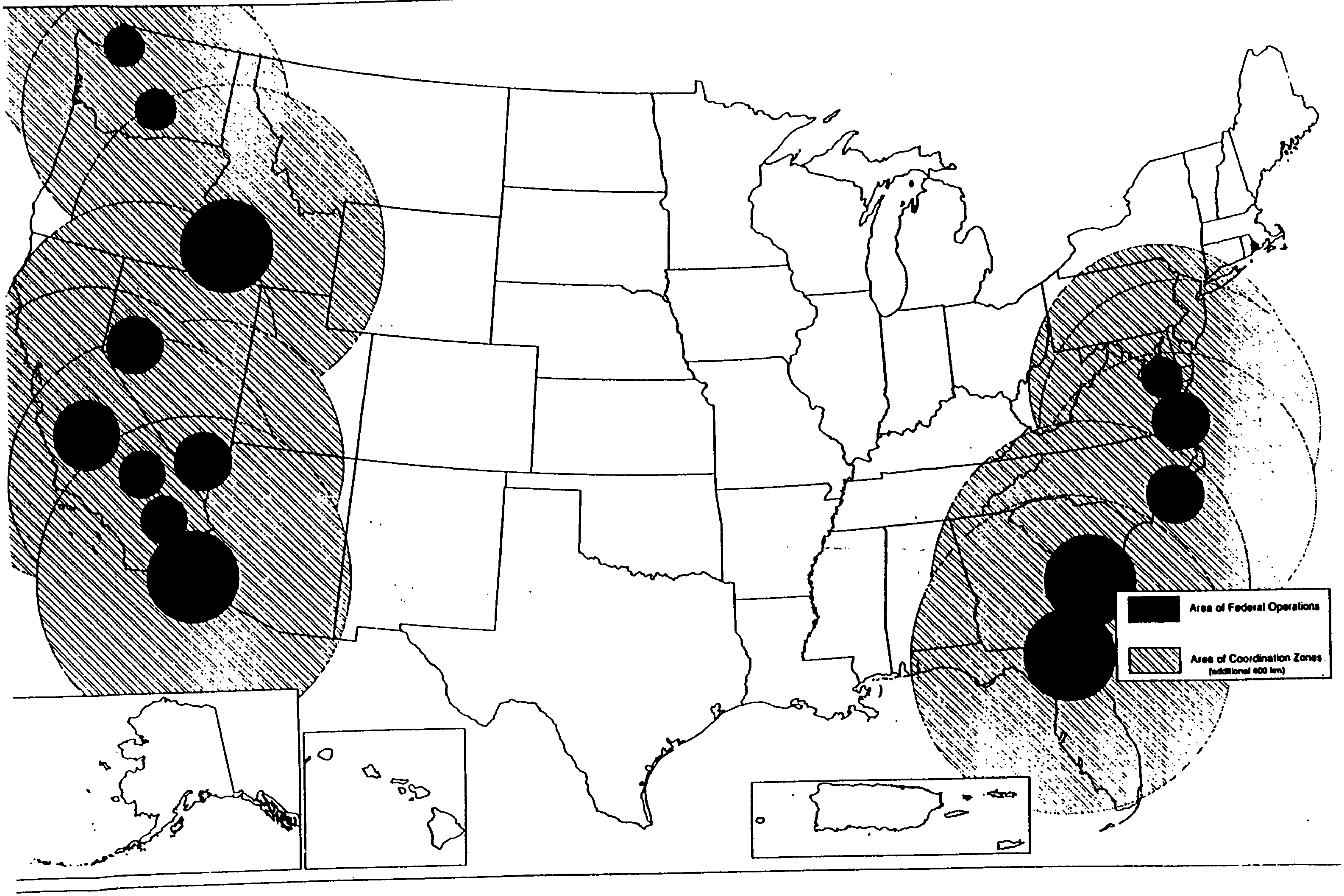

■ Area of Federal Operations
▨ Area of Coordination Zones (additional 400 km)

Figure III-3

Sites at which operations of Federal fixed microwave, tactical radio relay and aeronautical mobile stations in the 1710-1755 MHz band will be retained indefinitely.

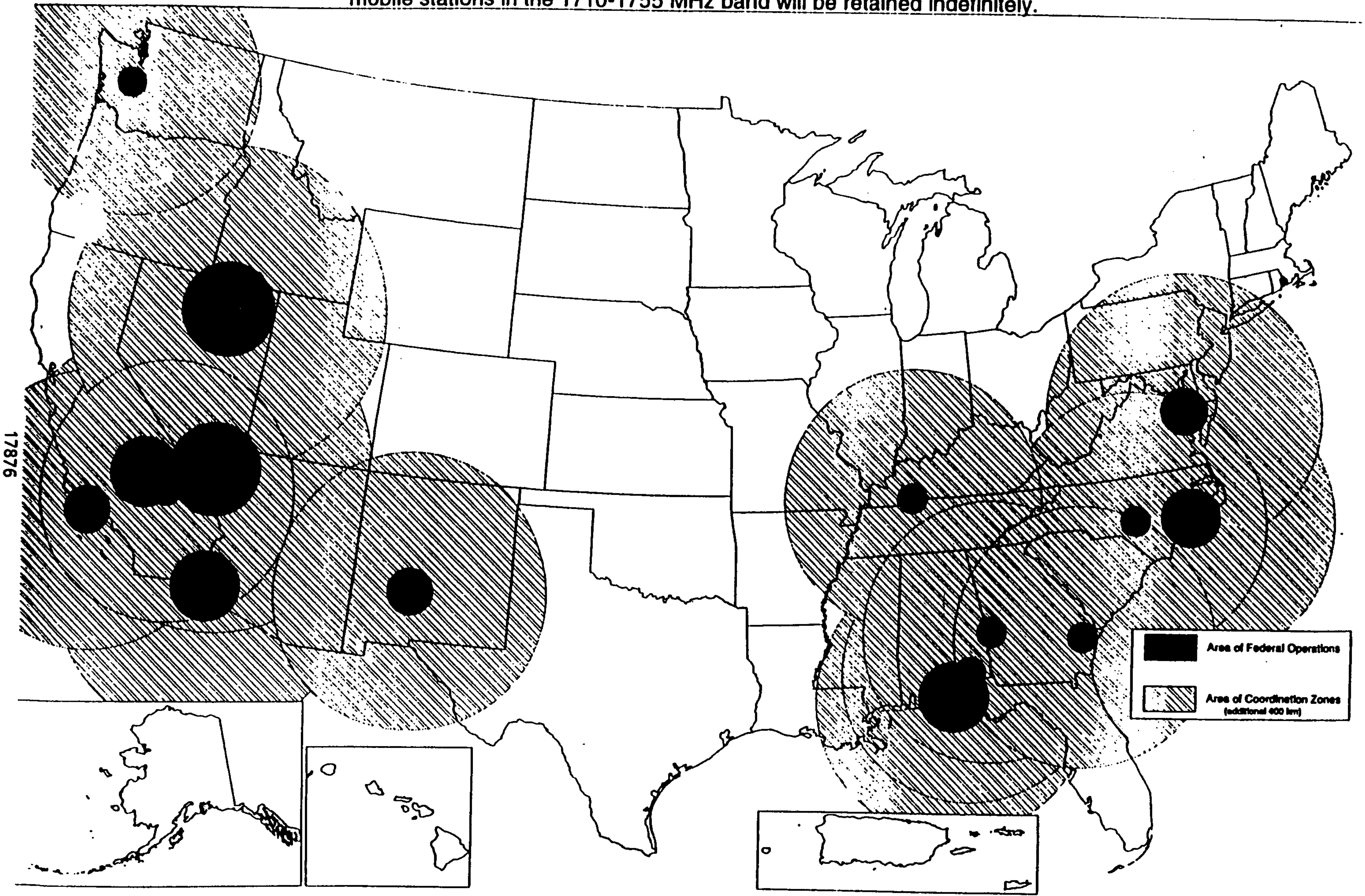
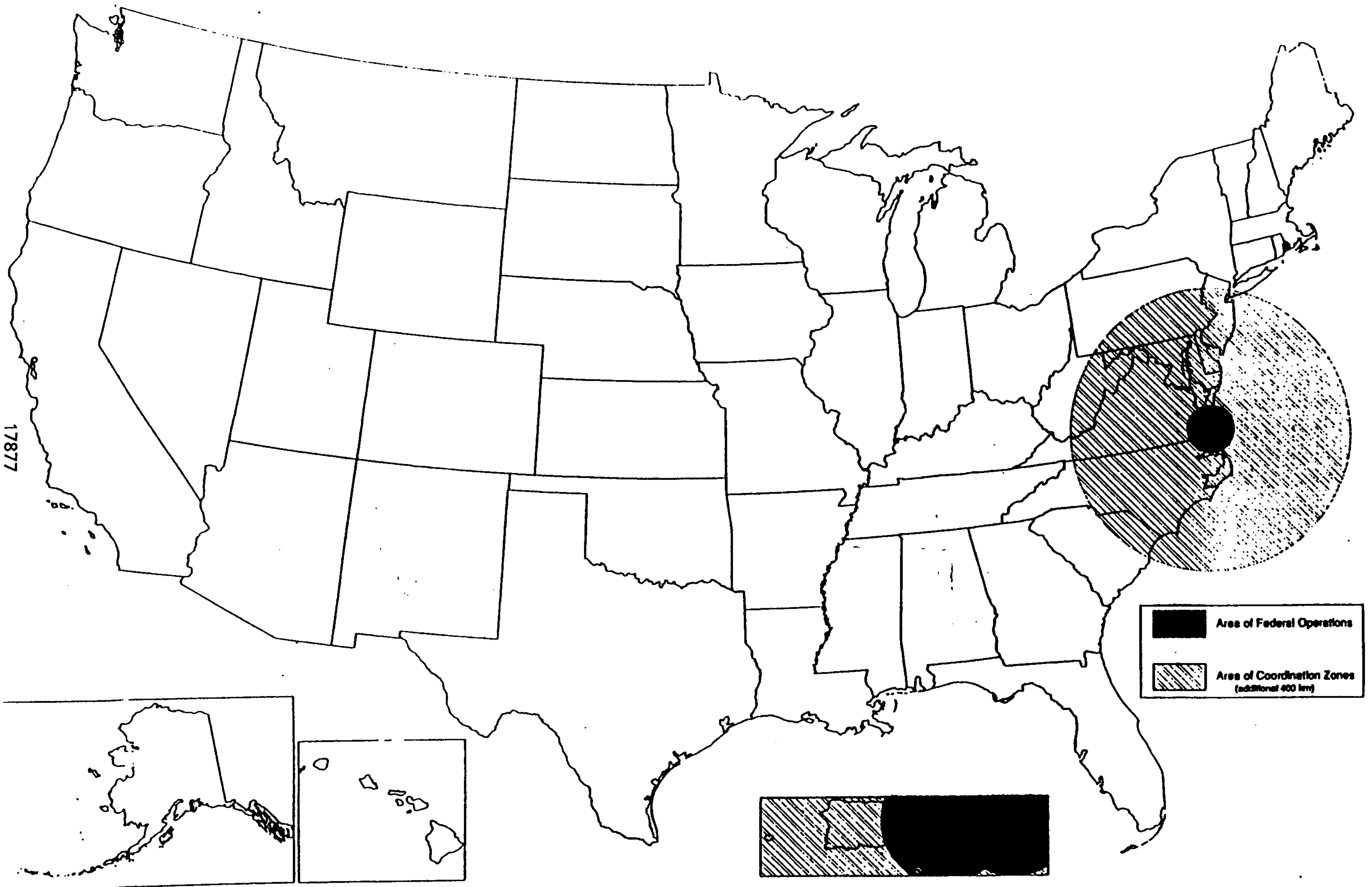

Area of Federal Operations
Area of Coordination Zones (additional 400 km)

Figure III-4

Sites at which Federal Airborne operations in the 4635-4660 MHz band will be continued for 14 years (2009).


Area of Federal Operations
Area of Coordination Zones (additional 400 km)

IV. Plan Overview

59. Introduction. The principle objective for the development of the Spectrum Plan is to ensure that the transferred spectrum is put to its best and most valued use and that the greatest benefit to the public is attained.[57] The Spectrum Plan must be consistent with the conditions, constraints and situations resulting from the Congressional mandate and NTIA's decisions. The Plan should be compatible with FCC decisions already made that impact the spectrum such as those allocating and assigning the 50 MHz that was made immediately available.[58] Moreover, the Plan and ensuing notices and proposals should be guided by FCC principles such as fostering the competitive offering of new technology and services.

60. Congressional Mandate. In the Omnibus Budget Reconciliation Act of 1993, Congress specified several conditions that will have an impact on the Plan. These were cited in Section I. Congress was concerned that the entire spectrum to be transferred not be immediately allocated and assigned. Citing the timetable that the Secretary of Commerce is required to develop for the withdrawal or limitation of Government assignments of the frequencies, the Act requires that the bands be allocated and assigned gradually--after a portion of the frequencies is reserved for a ten-year period. Thus the Plan must have two features:

- A reserve--A significant portion of the frequencies must be held in reserve, that is, not allocated and assigned, until after a ten-year period that begins on the date of submission of this Plan.[59]

- Gradually--The frequencies that are not identified for the reserve must be allocated and assigned gradually--that is, in steps, over the ten-year period.[60]

Congress further specified certain non-structural considerations such as encouraging new communications technology and fulfilling the FCC's responsibilities for safety of life and property.[61] These are considered in the following Section.

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[57] Notice of Proposed Rule Making, ET Docket No. 94-32, 9 FCC Rcd 6779, para. 8 (1994).

[58] First Report and Order and Second Notice of Proposed Rule Making, ET Docket No. 94-32, 10 FCC Rcd 4769 (1995). Second Report and Order, ET Docket 94-32, released 8/2/95, 60 FR 40712, 8/9/95.

[59] 47 U.S.C. § 925(b)(1)(B).

[60] 47 U.S.C. § 925(b)(1)(A).

[61] 47 U.S.C. § 925(b)(2).

61. Band Selection Impact. Important to the usefulness of the frequencies transferred from Government to private sector use are the number, size and location of the bands. Congress determined that a minimum amount of transferred spectrum, 200 megahertz, should be located below 5 GHz and further specified that at least 100 megahertz shall be located below 3 GHz. In its final selection process, NTIA identified twelve bands for reallocation, shown earlier in Table II-1, distinguished by their reallocation status, namely, whether or not the band will continue to be shared with Government users, and the reallocation schedule.[62] These differing conditions have led to fragmentation of the total spectrum to be transferred. The size of the bands range from 2 megahertz to 50 megahertz, and the median bandwidth is 10 megahertz, that is, half of the bands are 10 megahertz or less. Accordingly, some aggregation of the bands is anticipated as part of this Plan.

62. General Approach. The Plan for the allocation and assignment of the remaining spectrum will be guided in part by recent FCC decisions on the 50 megahertz of spectrum made immediately available in 1994 and 1995. This Plan does not constitute a proposal for the disposition of the remaining 185 megahertz of transferred spectrum, but rather lays out a series of rule making proceedings that responds to the requirements of the statute that mandates and details the transferral process.

63. Aggregation of Bands. The first step in this process is to aggregate the twelve bands into groupings for planning purposes. It will simplify the planning process to consider the many bands in fewer groupings, since some of the transferred bands are adjacent to other transferred bands, even though they may differ with respect to the allocation, the incumbent Government users, or the availability of the bands to non-Government users. Grouping the bands will also gather together those with similar physical properties such as propagation or optimum antenna characteristics. Subdividing the bands into different groups if they differ by at least 300 megahertz, or if the wave length changes by at least 15 percent, creates four separate groups of approximately equal size, *i.e.*, 50 to 70 megahertz, and generally comparable physical characteristics. These four groups of bands shown in Table IV-1 will be used to simplify the planning process.

64. Four Spectrum Groups. The FCC has already acted on three bands in Groups 2 and 4 that were made immediately by the 1993 Budget Act.

Group 2 is the largest group and contains 70 megahertz, with the largest contiguous grouping of transferred frequencies, adding up to 60 megahertz. These bands are also the most currently encumbered bands. The frequencies from 2400 to 2450 MHz are currently in use by Part 18 Industrial, Scientific, and Medical (ISM) devices (notably microwave ovens) and Part 15 low-power devices. The development of these latter devices has been encouraged by the FCC in recent rule makings that have established consumer devices in consumer bands and also equipment for local area networks. In addition, the adjacent 2390 to 2400 MHz band was recently designated by the FCC as a frequency for the development of unlicensed PCS data devices, which are envisioned as providing links for portable or nomadic computers. In its final report in March 1995, NTIA decided to supplement the 200 megahertz initially identified in its Preliminary Report in February 1994 with 35 megahertz lying within the 2400 to 2450 MHz band currently in use by ISM and low-power devices.

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[62] NTIA, U.S. DoC, Special Publication 95-32, Spectrum Reallocation Final Report, Response to Title VI - Omnibus Budget Reconciliation Act of 1993 (February 1995).

Group 4 consists of two adjacent 25 megahertz-wide bands. The FCC decided in 1995 to allocate the upper 25 megahertz of spectrum to the General Wireless Communications Service (GWCS). This new service includes both fixed and mobile stations and is subdivided into 5 megahertz licenses for Economic Area (EA) license areas.[63] A flexible approach to the technical and operational aspects of the service has been decided; virtually no technical standards have been mandated by the FCC and only a perimeter signal strength at the service boundaries has been established, unless a higher alternative is agreed upon by the licensed parties. Auctions are anticipated for the GWCS licenses after applications are received.

Group 3 consists of a single 50 megahertz-wide band and thus may be the most important band to be transferred from Government use. It has the fewest restrictions and limitations and, as the largest single band, offers the most potential for wide bandwidth services operating under a single set of rules. However, the band is currently used by non-Government fixed-satellite service licensees which will have to be considered in determining future use.

Group 1 is the most fragmented group with four disjointed bands that span the largest range of frequencies, namely, 365 megahertz. However, Group 1 contains what may ultimately be the most valuable band. The 1710 to 1755 MHz band is sufficiently close to the bands that in the U.S. and for much of the rest of the world are the frequencies already identified for the development of the next generation of mobile and portable communications. There will be increasing pressure for the commercial development of this band in the U.S. as the Personal Communications Service licensees are finally licensed, develop their service, and as the public appetite and use of personal communications for voice and data services increase. This band is also the most restricted in terms of development because of the remaining Government use of this band. While many Government users will be relocated to other bands, much Government usage will continue indefinitely, with significant areas, including major metropolitan areas, that will be denied to commercial development, as described in the proceeding section. (See Figure III-3.) In addition, access to the frequencies between 1710 and 1755 MHz will be delayed the most of any of the transferred bands. This points to the bands of Group 1 as the most reasonable candidates for the spectrum reserve mandated by Congress, which required that a significant portion of the transferred spectrum be held in reserve for ten years.

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[63] Second Report and Order, ET Docket No. 94-32, released August 2, 1995, FCC 95-319, para. 56. Reconsideration pending.

65. Scheduling Public Access. Based on the Congressional requirements and limitations on the bands, the following schedule permits prompt public access to the transferred bands consistent with these restrictions.

- Groups 2 and 4: The FCC will initiate rule makings to allocate these bands in late 1996. Decisions made in 1995 for the bands of the initial 50 megahertz already point to likely proposals for band use. (See below.) The frequencies of Group 2 are immediately available; and the remaining 25 megahertz of spectrum of Group 4 will become initially available on January 1, 1997.

- Group 3: In order for the public to access the single 50 megahertz of spectrum in Group 3 when it becomes available in 1999, the decisions as to the band's allocation and assignment should be initiated in 1997. Timely completion of this process will allow the FCC to accept applications and issue licenses shortly after the band becomes available in January 1999.

- Group 1: Consistent with the statute, the orders determining the allocation and assignment of the frequencies cannot made until 2006.[64] However, proposals for the disposition of the spectrum can be made before then and an appropriate record developed. Initial access to the important 45 megahertz of spectrum cannot occur until 2004 in any case.[65] (Since initial access to the other three bands of Group 1, which are only 5 and 10 megahertz wide, is available as early as 1999, the FCC should make it clear that it is open to petitions for use of these smaller bands on an earlier basis.) No specific amount of spectrum was identified to be held in reserve; the fact that the 1710 to 1755 MHz band will not be made available until 2004, that is, nearly 10 years, makes it an obvious choice to be held in reserve.

66. Allocation/Usage Options. The Commission has repeatedly stated that its objective is to ensure that spectrum is put to its best and most valued used and that the greatest benefit to the public is attained. In its Report and Order allocating the first 50 megahertz, the FCC stated that one way to achieve its goal is to adopt an allocation to both fixed and mobile services because permitting this broad use would allow licensees in commercial service to offer a wide range of services employing varying technologies. The approach was to allocate 25 megahertz for commercial fixed and mobile use without

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[64] 47 U.S.C. § 925(b)(1)(B).

[65] Final Report at 5-4.

identifying specific services; it was further decided that licenses for the spectrum would be available through competitive bidding to the extent possible and practical. The FCC concluded that the remaining 25 MHz should be allocated for unlicensed services rather than commercial fixed and mobile terrestrial uses. This also was predicted to yield public benefits in new service capabilities and sharing technologies, and to promote the Commission's goal of ensuring that spectrum is put to its best and most valued use.

67. The Commission will strive to achieve the above objective in our proceedings to address the remaining 185 MHz by applying the following plan.

- Propose a use deemed to ensure that the spectrum is put to its best and most valued use and which yields the greatest benefit to the public. In making its proposal, the Commission will take into account all factors, such as incumbent Government and non-Government operations that effect potential use of each band. Options for use include all potential services, including, but not limited, to those addressed in allocating the first 50 megahertz. As required by the Budget Act, this approach will ensure the availability of spectrum for, and stimulate the development of, a wide array of new technologies and services that will benefit the American public, some of which may not be currently envisioned.

- In addition, the FCC will be considering in a separate proceeding the special needs of the public safety community. NTIA and the FCC have chartered an advisory committee that will make recommendations later this year addressing these specific spectrum needs and related matters.[66] Therefore, the proposals for the remaining bands of transferred spectrum may include possible use of some portion of these bands for public safety.

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[66] See letter dated June 2, 1995, from Alice Rivlin, Director, Office of Management and Budget, to Reed Hundt, Chairman, FCC, approving creation of the advisory committee.

Table IV-1: *FCC Plan for Transferred Spectrum--Band Groupings & Availability*

Frequency Band (MHz)	**Width (MHz)**	**Availability/Access**
Group 1		
1390 - 1400	10	Initial 1999; full 2009
1427 - 1432	5	Initial 1999; full 2004
1670 - 1675	5	Initial 1999; 2 Gov. sites remain
1710 - 1755	45	Initial 2004; 16 Gov. sites remain, 444 Gov. microwave links remain
total	**65**	
Group 2*		
2300 - 2310	10	Immediate
2390 - 2400	10	Designated for Unlicensed PCS
2400 - 2402	2	In use by ISM & Part 15 devices
2402 - 2417	15	In use by ISM & Part 15 devices
2417 - 2450	33	In use by ISM & Part 15 devices
total	**70**	
Group 3		
3650 - 3700	50	Initial 1999; 3 Gov. sites remain; in use by non-Government FSS
total	**50**	
Group 4		
4635 - 4660	25	Initial 1997; full 2009
4660 - 4685	25	Allocated to new GWCS & auctions
total	**50**	
GRAND TOTAL	**235**	

* All bands in Group 2 are also in use by radio amateurs.

V. OTHER REQUIREMENTS

68. A requirement of the Budget Act is that this plan address "(A) the feasibility of reallocating portions of the spectrum from current commercial and other non-Federal uses to provide for more efficient use of the spectrum, and (B) innovation and marketplace developments that may affect the relative efficiencies of different spectrum allocations."[67] The Commission evaluates use of the spectrum on an ongoing basis to determine whether a need exists to modify use of any particular frequency band in light of changes in demand for different services or in light of advances in technology. The Commission's efforts are bolstered by extensive and ongoing interaction between the FCC and members of the private sector. In addition, on March 5, 1996, the Commission provided an opportunity for dialogue by holding an all-day *En Banc* hearing that specifically addressed spectrum management policy. Such an ongoing dialogue helps ensure that Commission actions reflect the latest developments in the communications industry. This dialogue also ensures that we are always examining our own allocations to provide efficient use of the spectrum, and to promote innovation and marketplace developments as required by the Budget Act. These efforts can be seen in a number of rule making activities.

69. Prior Planning for Reserve Bands. In the early 1970s, the Commission employed the concept of setting aside spectrum for new and existing users in Docket No. 18262,[68] where we reallocated 115 megahertz of spectrum in the 800-900 MHz region from UHF-TV broadcasting and Federal government use to new use by land mobile services. This action, which was one of the most significant reallocation initiatives undertaken by the Commission, was carried out to meet the growing needs of the land mobile industry. Initially, 40 megahertz of the newly available spectrum was allocated for cellular radio "high capacity" common carrier land mobile technologies, and another 30 megahertz was allocated to conventional and new trunked operations, and to private radio operations including specialized mobile radio (SMR) services. In addition to this 70 megahertz, the Commission responded to suggestions from the commenting parties by establishing and setting aside eight "land mobile reserve bands," encompassing a total of 45 megahertz of spectrum, to accommodate new land mobile services as well as unexpected growth in existing services. As a result of this action, we now have widespread mobile communication networks that are available to everyone. Since that time, the 45 megahertz of reserved spectrum has been used to increase the amount

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[67] 47 U.S.C. § 925(b)(3).

[68] See generally First Report and Order and Second Notice of Inquiry, Docket No. 18262, 35 Fed. Reg. 8644 (June 4, 1970); Second Report and Order, Docket No. 18262; 46 FCC 2d 752 (1974), reconsidered, Memorandum Opinion and Order, Docket No. 18262, 51 FCC 2d 945 (1975); aff'd sub nom. NARUC v. FCC, 525 F. 2d 630 (D.C. Cir. 1976), cert. denied, 425 U.S. 992 (1976).

of spectrum for both common carrier and private radio services, including provision of new air-to-ground telephone services and unlicensed PCS, and to introduce new spectrum-efficient digital technologies in advanced private radio systems.

70. More recently, in ET Docket No. 92-9, the Commission reallocated 220 megahertz of spectrum in the 1850-2200 MHz band from the private and common carrier fixed microwave services to accommodate emerging technologies.[69] This action required that existing microwave licensees move to higher bands or to alternative media during a reasonable transition period in accordance with a plan which provided for new services to reimburse existing users for costs incurred by the move. Of the 220 megahertz of spectrum identified in this proceeding, 140 megahertz proceeding have been designated for accommodation of the personal communications service, including 20 megahertz for unlicensed low-power PCS systems. Implementation of PCS is just beginning with two of the six available license blocks currently licensed and a third block currently at auction. At least one PCS system in the Washington D.C. area is now in operation and it is anticipated that this service will have a major effect on the communications industry and on the communications services that are available to the public. The confidence that the communications industry has in this service is evidenced by its willingness to invest large sums of money to obtain the initial license. Auctioning the first two license blocks raised over $7.7 billion raised for the U.S. Treasury. Bidding for the third license block continues and, to date, has nearly reached $8 billion for the single license block.

71. The Commission has also proposed to use a portion of the of the remaining spectrum identified for emerging technologies in ET Docket No. 92-9 for accommodation of Mobile Satellite Systems (MSS). On January 31, 1995, the Commission released a *Notice of Proposed Rule Making* in ET Docket No. 95-18, proposing to allocate the 1990-2025 MHz and 2165-2200 MHz bands for MSS use. Only the 2165-2200 MHz band is included in the emerging technologies spectrum. The 1990-2025 MHz band is currently used for broadcast auxiliary services and provision would have to be made to redesignate the use of the band.

72. *Current Efforts for New Technology*. As part of the Commission's ongoing efforts to promote new uses of spectrum, we are currently considering action on two Petitions for Rule Making requesting that spectrum be made available for new unlicensed uses. One petition, filed on May 15, 1995, by the Wireless Information Networks Forum ("WINForum") requests that 250 megahertz of spectrum at 5.1 - 5.35 GHz be allocated for a new high-speed, high-bandwidth, unlicensed radio service, or Shared Unlicensed Personal Radio Network ("SUPERNet"). According to WINForum, SUPERNet is designed to allow wireless access to

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[69] *See generally* *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, ET Docket No. 92-9, *First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd 6886 (1992), *Second Report and Order*, 8 FCC Rcd 6495 (1993), *Third Report and Order and Memorandum Opinion and Order*, 8 FCC Rcd 6589 (1993), *Memorandum Opinion and Order*, 9 FCC Rcd 1943 (1994).

the full range of data communications capabilities now being deployed in landline networks to support multimedia and other resource-intensive applications.[70] The second petition was filed May 24, 1995, by Apple Computer, Inc. ("Apple") and requests that 300 megahertz of spectrum at 5.15 - 5.30 GHz and 5.725 - 5.875 GHz be allocated for a new high-speed, high-bandwidth, unlicensed radio service. According to Apple, this allocation ("the NII Band") would promote the full development of a National Information Infrastructure by making possible high-bandwidth access and interaction throughout a limited geographic area, where mobility is key, and by providing as well for a wireless element of "community networks" serving a larger area.[71]

73. The Commission is also opening new frontiers by making available for use spectrum at frequencies that until recently were not technically feasible to use. On November 8, 1994, the Commission released a Notice of Proposed Rule Making (NPRM) proposing to open 18 GHz of spectrum in the frequency range between 40.5 GHz and 153 GHz. Of this, 9.5 GHz of spectrum was proposed for general unlicensed applications; 2.2 GHz of spectrum was proposed for vehicle-mounted radar systems; and 6.3 GHz of spectrum was proposed for licensed operations. A First Report and Order and Second Notice of Proposed Rule Making was released on December 15, 1995. In the First Report and Order, the Commission authorized the bands 46.7-46.9 GHz and 76-77 GHz for unlicensed vehicle radar systems and the band 59-64 GHz for general unlicensed applications.

74. The Commission is constantly reviewing existing rules to determine whether they meet the current needs of the communications industry and the public. If appropriate, the rules for services are revised to allow greater flexibility so that licensees can use the spectrum more efficiently to provide the services most desired by the public. One recent example is the Notice of Proposed Rule Making released on January 25, 1996, in WT Docket 96-6. This Notice proposes to amend the Commission's rules to permit fixed local loop service in addition to the mobile local loop services already authorized in the broadband Commercial Mobile Radio Services (CMRS). The notice also solicits comment on allowing provision of any fixed service in the broadband CMRS frequency bands. Proceedings such as this show an evolutionary approach to modifying use of spectrum.

75. The Commission also has proposed revising such widely used services as the television broadcast service. In July, 1992, the Commission adopted a Notice of Proposed Rule Making in MM Docket 87-268, proposing policies, procedures, and technical criteria to be used in allotting channels for an advanced television (ATV) service. Included in this item was a "draft" proposal for an ATV Table of Allotments. Review of these issues continues and, in a recent notice, the Commission reviewed developments of the last few years especially with regard to emerging possibilities for introduction of a dynamic and flexible digital broadcast technology. The Commission is considering an ATV Table of Allotments

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[70] WINForum's petition was placed on public notice on May 24, 1995, as RM-8648.

[71] Apple's petition was placed on public notice on June 8, 1995, as RM-8653.

with an emphasis on efficient use of the spectrum and possibilities for eventual recovery of spectrum no longer needed for TV broadcasting due to efficiencies of digital transmission.[72]

76. The preceding discussion highlights Commission proceedings that promote new use of spectrum and use of new spectrum. It provides an example of how the Commission continually evaluates the feasibility of reallocating portions of the spectrum from current commercial and other non-Federal uses to provide for more efficient use of the spectrum or expanding the types of services permitted to allow for new uses. As part of this continuing refinement of Commission rules, one of the Commission's goals is to promote and encourage innovation and marketplace developments that affect the relative efficiencies of different spectrum allocations.

77. Public Safety. The Budget Act requires that this plan contain appropriate provisions to ensure the safety of life and property in accordance with the Commission's responsibilities, given in Section 1 of the Communications Act.[73] In November 1995, the FCC and NTIA chartered the Public Safety Wireless Advisory Committee (PSWAC); the goal is to bring significant enhancements to the effectiveness and efficiency of public safety communications. It will focus on long term planning for public safety with emphasis on spectrum management for meeting the public safety community's requirements. It will estimate public safety needs and requirements and make recommendations for addressing them. As a federally-chartered advisory committee, the PSWAC will advise the FCC and NTIA on operational, technical and spectrum requirements of Federal, state and local public safety entities through the year 2010. The Report from the Advisory Committee is due to the FCC and NTIA in the summer of 1996 and will identify spectrum requirements and possible bands that would fulfill these requirements. The Advisory Committee is not focused on spectrum transferred by the Budget Act, but is considering all possibilities, including frequencies currently used exclusively by the Federal Government and separately by the private sector.

78. If the PSWAC Report were immediately available, specific recommendations from the Report or based on the Report could have been included. For example, specific proposals that address potential public safety use of certain frequency bands could be cited as alternative proposals to the general allocation. In view of the fact that the PSWAC Report will not be delivered until after the Spectrum Plan is due, the Spectrum Plan cannot cite specific proposals that would address public safety needs. However, what can be done is to indicate that, in developing proposals for the remaining transferred frequencies, the FCC will take into consideration the recommendations from the Advisory Committee. Accordingly, the FCC

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[72] Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, Fourth Further Notice Of Proposed Rule Making, released August 9, 1995, 10 FCC Rcd 10540 (1995).

[73] 47 U.S.C. § 925(b)(2)(C).

may identify possible use of some parts of this spectrum in support of the Advisory Committee plan for public safety. A separate proceeding to deal with the public safety issues developed by the Advisory Committee will be initiated in the near future.

79. IT IS ORDERED that the Secretary shall send copies of this Plan for Reallocated Spectrum to the United States Congress and to the President of the United States as required by the Omnibus Budget Reconciliation Act of 1993.

FEDERAL COMMUNICATIONS COMMISSION

William F. Caton
Acting Secretary

APPENDIX A

Omnibus Budget Reconciliation Act of 1993

Spectrum Reallocation and Competitive
Bidding Provisions in the Senate/House
passed Budget Reconciliation Bill
August 1993

TITLE VI-COMMUNICATIONS LICENSING AND SPECTRUM ALLOCATION IMPROVEMENT

SEC. 6001. TRANSFER OF AUCTIONABLE FREQUENCIES.

(a) AMENDMENT.--The National Telecommunications and Information Administration Organization Act (47 U.S.C. 901 et seq.) is amended-

(1) by striking the heading of part B and inserting the following:

"PART C- SPECIAL AND TEMPORARY PROVISIONS";

(2) by redesignating sections 131 through 135 as sections 151 through 155, respectively; and

(3) by inserting after part A the following new part:

"PART B- TRANSFER OF AUCTIONABLE FREQUENCIES.

"SEC. 111. DEFINITIONS.

"As used in this part:

"(1) The term 'allocation' means an entry in the National Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more radiocommunication services.

"(2) The term 'assignment' means an authorization given to a station licensee to use specific frequencies or channels.

"(3) The term 'the 1934 Act' means the Communications Act of 1934 (47 U.S.C. 151 et seq.).

"SEC. 112. NATIONAL SPECTRUM ALLOCATION PLANNING.

"The Assistant Secretary and the Chairman of the Commission shall meet, at least biannually, to conduct joint spectrum planning with respect to the following issues:

"(1) the extent to which licenses for spectrum use can be issued pursuant to section 309(j) of the 1934 Act to increase Federal revenues;

"(2) the future spectrum requirements for public and private uses, including State and local government public safety agencies;

"(3) the spectrum allocation actions necessary to accommodate those uses; and

"(4) actions necessary to promote the efficient use of the spectrum, including spectrum management techniques to promote increased shared use of the spectrum that does not cause harmful interference as a means of increasing commercial access.

"SEC. 113. IDENTIFICATION OF REALLOCABLE FREQUENCIES.

"(a) IDENTIFICATION REQUIRED.--The Secretary shall, within 18 months after the date of the enactment of the Omnibus Reconciliation Act of 1993, prepare and submit to the President and the Congress a report identifying and recommending for reallocation bands of frequencies--

"(1) that are allocated on a primary basis for Federal Government use;

"(2) that are not required for the present or identifiable future needs of the Federal Government;

"(3) that can feasibly be made available, as of the date of submission of the report or at any time during the next 15 years, for use under the 1934 Act (other than for Federal Government stations under section 305 of the 1934 Act);

"(4) the transfer of which (from Federal Government use) will not result in costs to the Federal Government, or losses of services or benefits to the public, that are excessive in relation to the benefits to the public that may be provided by non-Federal licensees; and

"(5) that are most likely to have the greatest potential for productive uses and public benefits under the 1934 Act if allocated for non-Federal use.

"(b) MINIMUM AMOUNT OF SPECTRUM RECOMMENDED.--

"(1) IN GENERAL.--In accordance with the provisions of this section, the Secretary shall recommend for reallocation, for use other than by Federal Government stations under section 305 of the 1934 Act (47 U.S.C. 305), bands of frequencies that in the aggregate span not less than 200 megahertz, that are located below 5 gigahertz, and that meet the criteria specified in paragraphs (1) through (5) of subsection (a). Such bands of frequencies shall include bands of frequencies, located below 3 gigahertz, that span in the aggregate not less than 100 megahertz.

"(2) MIXED USES PERMITTED TO BE COUNTED.--Bands of frequencies which a report of the Secretary under subsection (a) or (d)(1) recommends be partially retained for use by Federal Government stations, but which are also recommended to be reallocated to be made available under the 1934 Act for use by non-Federal stations, may be counted toward the minimum spectrum required by paragraph (1) of this subsection, except that--

"(A) the bands of frequencies counted under this paragraph may not count toward more than on-half of the minimums required by paragraph (1) of this subsection;

"(B) a band of frequencies may not be counted under this paragraph unless the assignments of the band to Federal Government stations under section 305 of the 1934 Act (47 U.S.C. 305) are limited by geographic area, by time, or by other means so as to guarantee that the potential use to be made by such Federal Government stations is substantially less (as measured by geographic area, time, or otherwise) than the potential use to be made by non-Federal stations; and

"(C) the operational sharing permitted under this paragraph shall be subject to the interference regulations prescribed by the Commission pursuant to section 305(a) of the 1934 Act and to coordination procedures that the Commission and the Secretary shall jointly establish and implement to ensure against harmful interference.

"(c) CRITERIA FOR IDENTIFICATION.--

"(1) NEEDS OF THE FEDERAL GOVERNMENT.--In determining whether a band of frequencies meets the criteria specified in subsection (a)(2), the Secretary shall--

"(A) consider whether the band of frequencies is used to provide a communications service that is or could be available from a commercial provider or other vendor;

"(B) seek to promote--

"(i) the maximum practicable reliance on commercially available substitutes;

"(ii) the sharing of frequencies (as permitted under subsection (b)(2));

"(iii) the development and use of new communications technologies; and

"(iv) the use of nonradiating communications systems where practicable; and

"(C) seek to avoid--

"(i) serious degradation of Federal Government services and operations;

"(ii) excessive costs to the Federal Government and users of Federal Government services; and

"(iii) excessive disruption of existing use of Federal Government frequencies by amateur radio licensees.

"(2) FEASIBILITY OF USE.--In determining whether a frequency band meets the criteria specified in subsection (a)(3), the Secretary shall--

"(A) assure that the frequency will be assigned by the Commission under section 303 of the 1934 Act (47 U.S.C. 303) within 15 years;

"(B) assume reasonable rates of scientific progress and growth of demand for telecommunications services;

"(C) seek to include frequencies which can be used to stimulate the development of new technologies; and

"(D) consider the immediate and recurring costs to reestablish services displaced by the reallocation of spectrum.

"(3) ANALYSIS OF BENEFITS.--In determining whether a band of frequencies meets the criteria specified in subsection (a)(5), the Secretary shall consider--

"(A) the extent to which equipment is or will be available that is capable of utilizing the band;

"(B) the proximity of frequencies that are already assigned for commercial or other non-Federal use;

"(C) the extent to which, in general, commercial users could share the frequency with amateur radio licensees; and

"(D) the activities of foreign governments in making frequencies available for experimentation or commercial assignments in order to support their domestic manufacturers of equipment.

"(4) POWER AGENCY FREQUENCIES.--

"(A) APPLICABILITY OF CRITERIA.--The criteria specified by subsection (a) shall be subsection (a) shall be deemed not to be met for any purpose under this part with regard to any frequency assignment to, or any frequency assignment used by, a Federal power agency for the purpose of withdrawing that assignment.

"(B) MIXED USE ELIGIBILITY.--The frequencies assigned to any Federal power agency may only be eligible for mixed use under subsection (b)(2) in geographically separate areas, but in those cases where a frequency is to be shared by an affected Federal power agency and a non-Federal user, such use by the non-Federal user shall not cause harmful interference to the affected Federal power agency or adversely affect the reliability of its power system.

"(C) DEFINITION.--As used in this paragraph, the term 'Federal power agency' means the Tennessee Valley Authority, the Bonneville Power Administration, the Western Area Power Administration, the Southwestern Power Administration, the Southeastern Power Administration, or the Alaska Power Administration.

"(5) LIMITATION ON REALLOCATION.--None of the frequencies recommended for reallocation in the reports required by this subsection shall have been recommended, prior to the date of enactment of the Omnibus Budget Reconciliation Act of 1993, for reallocation to non-Federal use by international agreement.

"(d) PROCEDURE FOR IDENTIFICATION OF REALLOCABLE BANDS OF FREQUENCIES.

"(1) SUBMISSION OF PRELIMINARY IDENTIFICATION TO CONGRESS.--Within 6 months after the date of the enactment of the Omnibus Budget Reconciliation Act of 1993, the Secretary shall prepare, make publicly available, and submit to the President, the Congress, and the Commission a report which makes a preliminary identification of reallocable bands of frequencies which meet the criteria established by this section.

"(2) PUBLIC COMMENT.--The Secretary shall provide interested persons with the opportunity to submit, within 90 days after the date of its publication, written comment on the preliminary report required by paragraph (1). The Secretary shall immediately transmit a copy of any such comment to the Commission.

"(3) COMMENT AND RECOMMENDATIONS FROM COMMISSION.--The Commission shall, within 90 days after the conclusion of the period for comment provided pursuant to paragraph (2), submit to the Secretary the Commission's analysis of such comments and the Commission's recommendations for responses to such comments, together with such other comments and recommendations as the Commission deems appropriate.

"(4) DIRECT DISCUSSIONS.--The Secretary shall encourage and provide opportunity for direct discussions among commercial representatives and Federal Government users of the spectrum to aid the Secretary in determining which frequencies to recommend for reallocation. The Secretary shall provide notice to the public and the Commission of any such discussions, including the name or names of any businesses or other persons represented in such discussions. A representative of the Commission (and of the Secretary at the election of the Secretary) shall be permitted to attend any such discussions. The Secretary shall provide the public and the Commission with an opportunity to comment on the results of any such discussions prior to the submission of the final report required by subsection (a).

"(e) TIMETABLE FOR REALLOCATION AND LIMITATION.--

"(1) TIMETABLE REQUIRED.--The Secretary shall, as part of the reports required by subsections (a) and (d)(1), include a timetable that recommends effective dates by which the President shall withdraw or limit assignments of the frequencies specified in such reports.

"(2) EXPEDITED REALLOCATION.--

"(A) REQUIRED REALLOCATION.--The Secretary shall, as part of the report required by subsection (d)(1), specifically identify and recommend for immediate reallocation bands of frequencies that in the aggregate span not less that 50 megahertz, that meet the criteria described in subsection (a), and that can be made available for reallocation immediately upon issuance of the report required by subsection (d)(1). Such bands of frequencies, located below 3 gigahertz, that in the aggregate span not less than 25 megahertz.

"(B) PERMITTED REALLOCATION.--The Secretary may, as part of such report, identify and recommend bands of frequencies for immediate reallocation for a mixed use pursuant to subsection (b)(2), but such bands of frequencies may not count toward the minimums required by subparagraph (A).

"(3) DELAYED EFFECTIVE DATES.--In setting the recommended delayed effective dates, the Secretary shall--

"(A) consider the need to reallocate bands of frequencies as early as possible, taking into account the requirements of paragraphs (1) and (2) of section 115(b):

"(B) be based on the useful remaining life of equipment that has been purchased or contracted for to operate on identified frequencies;

"(C) consider the need to coördinate frequency use with other nations; and

"(D) take into account the relationship between the costs to the Federal Government of changing to different frequencies and the benefits that may be obtained from commercial and other non-Federal uses of the reassigned frequencies.

"SEC. 114. WITHDRAWAL OR LIMITATION OF ASSIGNMENT TO FEDERAL GOVERNMENT STATIONS.

"(a) IN GENERAL.--The President shall--

"(1) within 6 months after receipt of a report by the Secretary under subsection (a) or (d)(1) of section 113, withdraw the assignment to a Federal Government station of any frequency which the report recommends for immediate reallocation;

"(2) within either such 6-month period, limit the assignment to a Federal Government station of any frequency which the report recommends be made immediately available for mixed use under section 113(b)(2);

"(3) by the delayed effective date recommended by the Secretary under section 113(e) (except as provided in subsection (b)(4) of this section), withdraw or limit the assignment to a Federal Government station of any frequency which the report recommends be reallocated or made available for mixed use on such delayed effective date;

"(4) assign or reassign other frequencies to Federal Government stations as necessary to adjust to such withdrawal or limitation of assignments; and

"(5) transmit a notice and description to the Commission and each House of Congress of the actions taken under this subsection.

"(b) EXCEPTIONS.--

"(1) AUTHORITY TO SUBSTITUTE.--If the President determines that a circumstance described in paragraph (2) exists, the President--

"(A) may substitute an alternative frequency or frequencies for the frequency that is subject to such determination and withdraw (or limit) the assignment of that alternative frequency in the manner required by subsection (a); and

"(B) shall submit a statement of the reasons for taking the action described in subparagraph (A) to the Commission, Committee on Energy and Commerce of the House of Representative, and the Committee on Commerce, Science and Transportation of the Senate.

"(2) GROUNDS FOR SUBSTITUTION.--For purposes of paragraph (1), the following circumstances are described in this paragraph:

"(A) the reassignment would seriously jeopardize the national defense interests of the United States;

"(B) the frequency proposed for reassignment is uniquely suited to meeting important governmental needs;

"(C) the reassignment would seriously jeopardize public health or safety;

"(D) the reassignment will result in costs to the Federal Government that are excessive in relation to the benefits that may be obtained from commercial or other non-Federal uses of the reassigned frequency; or

"(E) the reassignment will disrupt the existing use of a Federal Government band of frequencies by amateur radio licensees.

"(3) CRITERIA FOR SUBSTITUTED FREQUENCIES.--For purposes of paragraph (1), a frequency may not be substituted for a frequency identified and recommended by the report of the Secretary under section 113(a) unless the substituted frequency also meets each of the criteria specified by section 113(a).

"(4) DELAYS IN IMPLEMENTATION.--If the President determines that any action cannot be completed by the delayed effective date recommended by the Secretary pursuant to section 113(e), or that such an action by such date would result in a frequency being unused as a consequence of the Commission's plan under section 115, the President may--

"(A) withdraw or limit the assignment to Federal Government stations on a later date that is consistent with such plan, except that the President shall notify each committee specified in paragraph (1)(B) and the Commission of the reason the withdrawal or limitation at a later date is required; or

"(B) substitute alternative frequencies pursuant to the provisions of this subsection.

"SEC. 115. DISTRIBUTION OF FREQUENCIES BY THE COMMISSION.

"(a) ALLOCATION AND ASSIGNMENT OF IMMEDIATELY AVAILABLE FREQUENCIES.--With respect to the frequencies made available for immediate reallocation pursuant to section 113(e)(2), the Commission, not later than 18 months after the date of enactment of the Omnibus Budget Reconciliation Act of 1993, shall issue regulations to allocate such frequencies and shall propose regulations to assign such frequencies.

"(b) ALLOCATION AND ASSIGNMENT OF REMAINING AVAILABLE FREQUENCIES.--With respect to the frequencies made available for reallocation pursuant to section 113(e)(3), the Commission shall, not later than 1 year after receipt of the report required by section 113(a), prepare, submit to the President and the Congress, and implement, a plan for the allocation and assignment under the 1934 Act of such frequencies. Such plan shall--

"(1) not propose the immediate allocation and assignment of all such frequencies but, taking into account the timetable recommended by the Secretary pursuant to section 113(e), shall propose--

"(A) gradually to allocate and assign the frequencies remaining, after making the reservation required by subparagraph (B), over the course of 10 years beginning on the date of submission of such plan; and

"(B) to reserve a significant portion of such frequencies for allocation and assignment beginning after the end of such 10-year period;

"(2) contain appropriate provisions to ensure--

"(A) the availability of frequencies for new technologies and services in accordance with the policies of section 7 of the 1934 Act (47 U.S.C. 157);

"(B) the availability of frequencies to stimulate the development of such technologies; and

"(C) the safety of life and property in accordance with the policies of section 1 of the 1934 Act (47 U.S.C. 151);

"(3) address (A) the feasibility of reallocating portions of the spectrum from current commercial and other non-Federal uses to provide for more efficient use of the spectrum, and (B) innovation and marketplace developments that may affect the relative efficiencies of different spectrum allocations;

"(4) not prevent the Commission from allocating frequencies, and assigning licenses to use frequencies, not included in the plan; and

"(5) not preclude the Commission from making changes to the plan in future proceedings.

SEC. 116 AUTHORITY TO RECOVER REASSIGNED FREQUENCIES.

"(a) AUTHORITY OF PRESIDENT.--Subsequent to the withdrawal of assignment to Federal Government stations pursuant to section 114, the President may reclaim reassigned frequencies for reassignment to Federal Government stations in accordance with this section.

"(b) PROCEDURE FOR RECLAIMING FREQUENCIES.--

"(1) UNALLOCATED FREQUENCIES.--If the frequencies to be reclaimed have not been allocated or assigned by the Commission pursuant to the 1934 Act, the President shall follow the procedures for substitution of frequencies established by section 114(b) of this part.

"(2) ALLOCATED FREQUENCIES.--If the frequencies to be reclaimed have been allocated or assigned by the Commission, the President shall follow the procedures for substitution of frequencies established by section 114(b) of this part, except that the statement required by section 114(b)(1)(B) shall include--

"(A) a timetable to accommodate an orderly transition for licensees to obtain new frequencies and equipment necessary for its utilization; and

"(B) an estimate of the cost of displacing spectrum users licensed by the Commission.

"(c) COSTS OF RECLAIMING FREQUENCIES.--The Federal Government shall bear all costs of reclaiming frequencies pursuant to this section, including the cost of equipment which is rendered unusable, the cost of relocating operations to a different frequency, and any other costs that are directly attributable to the reclaiming of the frequency pursuant to this section, and there are authorized to be appropriated such sums as may be necessary to carry out the purposes of this section.

"(d) EFFECTIVE DATE OF RECLAIMED FREQUENCIES.--The Commission shall not withdraw licenses for any reclaimed frequencies until the end of the fiscal year following the fiscal year in which a statement under section 114(b)(1)(B) pertaining to such frequencies is received by the Commission.

"(e) EFFECT ON OTHER LAW.--Nothing in this section shall be construed to limit or otherwise affect the authority of the President under section 706 of the 1934 Act (57 U.S.C. 606).

"SEC. 117. EXISTING ALLOCATION AND TRANSFER AUTHORITY RETAINED.

"(a) ADDITIONAL REALLOCATION.--Nothing in this part prevents or limits additional reallocation of spectrum from the Federal Government to other users.

"(b) IMPLEMENTATION OF NEW TECHNOLOGIES AND SERVICES.--Notwithstanding any other provision of this part--

"(1) the Secretary may, consistent with section 104(e) of this Act, at any time allow frequencies allocated on a primary basis for Federal Government use to be used by non-Federal licensees on a mixed-use basis for the purpose of facilitating the prompt implementation of new technologies or services and for other purposes; and

"(2) the Commission shall make any allocation and licensing decisions with respect to such frequencies in a timely manner and in no event later than the date required by section 7 of the 1934 Act."

(b) CONFORMING AMENDMENT TO ENSURE COLLECTION OF FCC FEES.---Section 104 of the National Telecommunications and Information Administration Organization Act (47 U.S.C. 903) is amended by adding at the end the following new subsection:

"(e) PROOF OF COMPLIANCE WITH FCC LICENSING REQUIREMENTS.--

"(1) AMENDMENT TO MANUAL REQUIRED.--

Within 90 days after the date of enactment of this subsection, the Secretary and the NTIA shall amend the spectrum management document described in subsection (a) to require that--

"(A) no person or entity (other than an agency or instrumentality of the United States) shall be permitted, after 1 year after such date of enactment, to operate a radio station utilizing a frequency that is authorized for the use of government stations pursuant to section 103(b)(2)(A) of this Act for any non-government application unless such person or entity has submitted to NTIA proof, in a form prescribed by such manual, that such person or entity has obtained a license from the Commission; and

"(B) no person or entity (other than an agency or instrumentality of the United States) shall be permitted, after 1 year after such date of enactment, to utilize a radio station belonging to the United States for any non-government application unless such person or entity has submitted to the NTIA proof, in a form prescribed by such manual, that such person or entity has obtained a license from the Commission.

"(2) RETENTION OF FORMS.--The NTIA shall maintain on file the proofs submitted under paragraph (1), or facsimiles thereof.

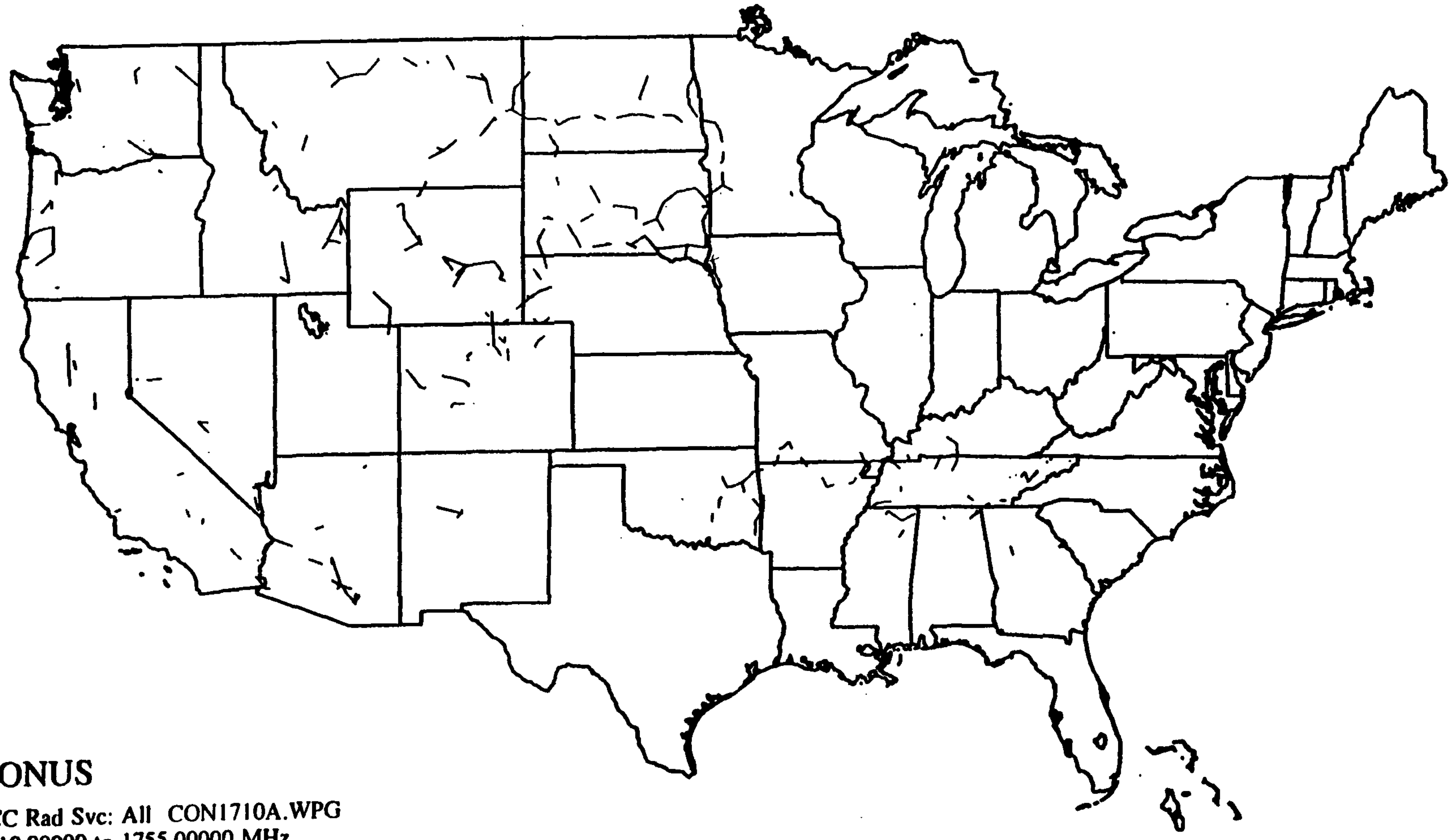
"(3) CERTIFICATION.--Within 1 year after the date of enactment of this subsection, the Secretary and the NTIA shall certify to the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate that-

"(A) the amendments required by paragraph (1) have been accomplished; and

"(B) the requirements of subparagraphs (A) and (B) of such paragraph are being enforced.".

APPENDIX B

Federal Government Microwave Systems to be Retained Indefinitely in the 1710-1755 MHz band



CONUS

FCC Rad Svc: All CON1710A.WPG
1710.00000 to 1755.00000 MHz

Appendix B

Federal Government Microwave Systems to be Retained Indefinitely in the 1710-1755 MHz band

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1710.0	1M60	D7W	FAA	CA	127422	-433272	CA	127170	-434180
1710.0	10M0	F9W	DOE B	WA	174088	-424255	WA	174427	-425011
1710.4	1M60	F9W	FAA SO	VI	66077	-233900	PR	65768	-236752
1710.4	1M60	F9W	FAA SO	VI	63844	-232923	VI	63722	-233302
1710.5	800K	F8W	TVA TVA	TN	131418	-321326	TN	131083	-320525
1710.5	800K	F9W	FAA SO	BA	92554	-285392	BA	92536	-285459
1710.5	800K	F9W	FAA SO	FL	92311	-289829	FL	92334	-289535
1711.0	800K	F9W	FAA SW	NM	126004	-383773	NM	126176	-383781
1711.0	300K	F8W	CG 17	AK	199320	-474480	AK	199260	-474000
1711.0	300K	F8W	CG 17	AK	210180	-485160	AK	209640	-485400
1711.0	300K	F8W	CG 17	AK	202860	-478320	AK	204300	-479400
1711.0	1M60	D7W	FAA	CA	140868	-437256	CA	139208	-437033
1711.0	1M60	F9W	TC	HI	75036	-564842	HI	74558	-562541
1711.0	1M80	F9W	DOE M	CA	118994	-413384	CA	118965	-413576
1711.0	1M60	F9W	DOE B	WA	171222	-442106	WA	172858	-442534
1711.0	1M98	F9W	FAA AL	AK	220381	-539431	AK	220426	-539211
1711.0	1M00	F9W	DOE M	AZ	117600	-411355	AZ	117612	-411606
1711.0	2M00	F9W	DOE M	CA	121500	-412281	CA	121000	-412847
1711.0	1M60	F9W	IRGP	WY	152882	-377838	WY	152455	-378110
1711.0	1M90	F9W	DOE M	AZ	117788	-401038	AZ	118389	-402388
1712.0	3M20	F7W	FAA EA	PA	148810	-272624	PA	148662	-272532
1712.0	3M20	D7W	FAA SO	FL	92856	-289077	FL	92970	-289148
1712.0	3M20	F7W	FAA EA	VA	133675	-275403	VA	133461	-275389
1712.1	3M20	D7W	FAA NM	UT	146785	-403052	UT	146765	-403083
1712.5	1M60	F9W	IRGP	WY	153865	-382894	WY	152916	-384462
1713.0	5M00	F9W	DOE M	AZ	131953	-397384	AZ	131778	-397850
1713.0	3M20	F7W	FAA EA	VA	133338	-274727	VA	133514	-274909
1713.0	1M60	D7W	FAA	CA	126216	-421251	CA	125453	-421352

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1713.5	5M00	F9W	IRGP	CO	141333	-383329	CO	140709	-382564
1714.0	1M90	F9W	DOE M	AZ	120328	-402479	AZ	121119	-402521
1715.0	7M30	F9W	DOE M	MT	172536	-379825	MT	172907	-382727
1715.0	7M30	F9W	DOE M	ND	169018	-364098	ND	168680	-363333
1715.0	7M30	F9W	DOE M	MT	167374	-380431	MT	167069	-380854
1715.0	7M30	F9W	DOE M	ND	168726	-360824	ND	169084	-358615
1715.0	5M00	F9W	CG 13	OR	157163	-447071	OR	158141	-446006
1715.0	7M30	F9W	DOE M	ND	169901	-350287	ND	168599	-349013
1715.0	7M30	F9W	DOE M	ND	168761	-373815	MT	169618	-376110
1715.0	7M30	F9W	DOE M	ND	168655	-367812	ND	168068	-369417
1715.0	10M0	F9W	DOE M	MT	174629	-395282	MT	174719	-395082
1715.0	7M30	F9W	DOE M	MT	166048	-387008	MT	165827	-386054
1715.0	6M40	F9W	DOE M	MT	173850	-402133	MT	174478	-402701
1715.0	5M00	F9W	DOE M	CO	140720	-389603	CO	140566	-388869
1715.0	2M00	F8W	CG 07	PR	65926	-236854	VI	66092	-233902
1715.0	800K	F9W	FAA EA	PA	145779	-288857	PA	145703	-288947
1715.0	7M30	F9W	DOE M	ND	168874	-352716	ND	168863	-352407
1715.0	7M30	F9W	DOE M	SD	161030	-347259	SD	160618	-348133
1715.0	7M30	F9W	DOE M	MN	165260	-345255	MN	164368	-345339
1715.0	7M30	F9W	DOE M	NE	152434	-347587	IA	153104	-346583
1715.0	1M00	F9W	TVA TVA	KY	133403	-318062	KY	133297	-318218
1715.0	8M00	F9W	TVA TVA	KY	131750	-318491	KY	132113	-318827
1715.0	8M00	F9W	TVA TVA	KY	134119	-313124	KY	133219	-311483
1715.0	8M00	F9W	TVA TVA	TN	126340	-306826	TN	126201	-307386
1715.0	8M00	F9W	TVA TVA	AL	125319	-308822	AL	124538	-309814
1715.0	8M00	F9W	TVA TVA	TN	131259	-298113	TN	131705	-297792
1715.0	8M00	F9W	TVA TVA	TN	130161	-312285	TN	131361	-311500
1715.0	8M00	F9W	TVA TVA	TN	130036	-301734	TN	129568	-302264
1715.0	5M00	F9W	DOE M	AZ	124566	-404822	AZ	124921	-403623
1715.0	3M50	F9W	DOE B	WA	167315	-429601	WA	167281	-429533
1715.0	3M50	F9W	DOE B	WA	167325	-429604	WA	167310	-429547
1715.0	10M0	F9W	DOE B	OR	164295	-427485	OR	164125	-426895
1715.0	5M00	F9W	DOE B	MT	167456	-405619	MT	165960	-406350
1715.0	10M0	F9W	DOE B	ID	156763	-402794	ID	155914	-403584

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1715.0	1M60	F9W	FAA NM	CO	142699	-391546	CO	140723	-389612
1715.0	7M30	F9W	DOE M	SD	155335	-355048	SD	155497	-352983
1715.0	7M30	F9W	DOE M	SD	159668	-347274	SD	159703	-348433
1715.0	7M30	F9W	DOE M	SD	159669	-358054	SD	159931	-361289
1715.0	1M00	F9W	TVA TVA	TN	129400	-303803	TN	129387	-303864
1715.0	7M30	F9W	DOE M	SD	155627	-364308	SD	155924	-361557
1715.0	8M00	F9W	TVA TVA	AL	124933	-313626	AL	124560	-313380
1715.0	7M30	F9W	DOE M	SD	156869	-347941	SD	158198	-348366
1715.0	6M20	F9W	DOE W	OK	130436	-341233	AR	130696	-339725
1715.0	1M60	F9W	DOE M	SD	159703	-353584	SD	159729	-353558
1715.0	6M20	F9W	DOE W	OK	124608	-340899	AR	125866	-339747
1715.0	6M20	F9W	DOE W	OK	129125	-342802	OK	130055	-341595
1715.0	6M20	F9W	DOE W	OK	122904	-340864	OK	122950	-340887
1715.0	6M20	F9W	DOE W	OK	126309	-346223	OK	127266	-346046
1715.0	3M50	F9W	DOE W	MO	132017	-334360	AR	130907	-333354
1715.0	10M0	F9W	DOE M	SD	154795	-371561	NE	153486	-371170
1716.0	1M60	F9W	IRGP	WY	152246	-377143	WY	152455	-378110
1716.0	1M90	F9W	DOE M	AZ	117788	-401038	AZ	117378	-401657
1716.0	3M20	D7W	FAA	HI	76078	-565848	HI	77030	-569165
1716.5	5M00	F9W	IRGP	CO	141333	-383329	CO	141939	-386573
1716.5	1M60	F9W	FAA WP	HI	74540	-562553	HI	76556	-568085
1716.5	3M20	D7W	FAA WP	HI	70985	-558221	HI	70978	-558171
1717.0	7M30	F9W	DOE M	WY	156158	-389310	WY	156448	-389495
1717.0	3M20	D7W	FAA WP	NV	136035	-420315	NV	137310	-421921
1717.0	3M70	F9W	FAA AL	AK	220375	-539585	AK	220530	-538303
1718.0	2M00	F8W	CG 07	PR	65926	-236854	VI	66092	-233902
1718.5	2M00	F9W	FAA NM	MT	168324	-410011	MT	168907	-410700
1719.0	1M90	F9W	DOE M	AZ	117788	-401038	AZ	117363	-399533
1719.0	1M60	D7W	FAA	AZ	116670	-398400	AZ	115812	-399153
1719.0	1M60	D7W	FAA	CA	121158	-415632	CA	122406	-417153
1719.0	2M00	F9W	FAA NM	OR	152522	-442354	OR	152472	-442777
1719.0	2M00	F9W	FAA NM	OR	164515	-442530	OR	164121	-441336
1719.0	5M00	F9W	TC	HI	77046	-569161	HI	77465	-568801
1719.0	5M00	F9W	TC	HI	70519	-559630	HI	74558	-562541

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1719.5	5M00	F9W	IRGP	CO	140739	-382866	CO	140709	-382564
1720.0	1M60	F9W	CG 13	WA	174143	-448827	WA	173267	-447495
1720.0	3M50	F9W	FAA CE	MO	141471	-340976	MO	141094	-340693
1720.0	3M50	F9W	FAA CE	MO	141471	-340976	MO	141094	-340693
1720.0	3M20	D7W	FAA NM	MT	168906	-410762	MT	168907	-410700
1720.0	8M00	F9W	TVA TVA	MS	123321	-319306	MS	122438	-320081
1720.0	5M00	F9W	CG 13	OR	166158	-445976	WA	167118	-445671
1720.0	5M00	F9W	AR CE	NE	148926	-345472	IA	149776	-345720
1720.0	1M60	D7W	DOE M	AZ	116794	-398836	AZ	115685	-399553
1720.0	10M0	F9W	DOE M	MT	172080	-402144	MT	172858	-400863
1720.0	10M0	F9W	DOE M	MT	173286	-398716	MT	173338	-397037
1720.0	7M30	F9W	DOE M	SD	155827	-358840	SD	156712	-356718
1720.0	8M00	F9W	TVA TVA	MS	125581	-321726	MS	124473	-319656
1720.0	3M20	F7W	FAA EA	VA	133338	-274727	VA	132824	-274297
1721.0	5M00	F9W	TVA TVA	TN	126790	-309194	TN	127208	-310020
1721.0	1M60	F9W	IRGP	WY	152903	-377593	WY	152455	-378110
1721.0	1M60	F9W	FAA SO	GA	120170	-303480	GA	121168	-303933
1721.0	1M60	F9W	IRGP	WY	153851	-382709	WY	154277	-378869
1722.0	800K	F8W	CG 17	AK	216900	-527940	AK	218329	-530436
1722.0	3M20	D7W	FAA WP	HI	72722	-561036	HI	74540	-562553
1722.0	3M20	D7W	FAA NM	UT	146829	-403111	UT	146918	-403080
1722.5	800K	F9W	FAA WP	HI	71677	-558682	HI	70982	-558086
1722.5	800K	F9W	FAA WP	HI	77030	-569165	HI	76556	-568095
1722.5	3M20	D7W	FAA WP	HI	76556	-568085	HI	77428	-569311
1722.5	3M20	D7W	FAA WP	HI	71677	-558682	HI	70982	-558086
1723.0	2M00	F9W	FAA AL	AK	220198	-540068	AK	220236	-539939
1725.0	3M50	F9W	DOE B	OR	163908	-441556	OR	163859	-441621
1725.0	7M30	F9W	DOE M	MT	172536	-379825	MT	170289	-379073
1725.0	7M30	F9W	DOE M	MT	164987	-388236	MT	165827	-386054
1725.0	7M30	F9W	DOE M	MT	168624	-378468	MT	168939	-378603
1725.0	7M30	F9W	DOE M	MN	161376	-343987	MN	161874	-345357
1725.0	7M30	F9W	DOE M	MN	167327	-345708	MN	166228	-345369
1725.0	4M60	F9W	DOE M	CA	146370	-441083	CA	146202	-440795
1725.0	3M50	F9W	DOE B	WA	165975	-428871	WA	167349	-431969

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1725.0	10M0	F9W	DOE B	OR	158583	-444605	OR	158817	-442935
1725.0	10M0	F9W	DOE B	OR	156137	-443028	OR	154809	-445600
1725.0	10M0	F9W	DOE B	OR	155704	-446802	OR	155557	-447495
1725.0	7M30	F9W	DOE M	SD	156869	-347941	SD	155413	-347915
1725.0	800K	F9W	DOE B	OR	164144	-436010	OR	164287	-436329
1725.0	1M60	F9W	DOE B	OR	160216	-444785	OR	161478	-443234
1725.0	10M0	F9W	DOE B	OR	156720	-447026	OR	158141	-446005
1725.0	7M30	F9W	DOE M	ND	168236	-351168	ND	168863	-352407
1725.0	1M60	F9W	DOE B	WA	169109	-443296	WA	169018	-445555
1725.0	4M70	F9W	DOE W	AR	131030	-324782	MO	132450	-325534
1725.0	8M00	F9W	TVA TVA	TN	130589	-319799	TN	130729	-319844
1725.0	8M00	F9W	TVA TVA	TN	130242	-299859	TN	128928	-301211
1725.0	10M0	F9W	TVA TVA	TN	131734	-314110	TN	130467	-314808
1725.0	10M0	F9W	TVA TVA	TN	126630	-323085	TN	126728	-321035
1725.0	10M0	F9W	TVA TVA	TN	126270	-324535	TN	126000	-324139
1725.0	8M00	F9W	TVA TVA	GA	125615	-308057	AL	124959	-309191
1725.0	8M00	F9W	TVA TVA	AL	125319	-308822	AL	125582	-308724
1725.0	1M60	F9W	IRGP	WY	153862	-382894	WY	151720	-384894
1725.0	6M20	F9W	DOE W	OK	127202	-341195	AR	125866	-339747
1725.0	6M20	F9W	DOE W	OK	129125	-342802	OK	128780	-344955
1725.0	7M30	F9W	DOE M	SD	164888	-369847	ND	165835	-369430
1725.0	3M50	F9W	DOE W	MO	133779	-336023	MO	133007	-335532
1725.0	7M30	F9W	DOE M	ND	168964	-356830	ND	168757	-355266
1725.0	5M00	F9W	DOE M	WY	149590	-393815	UT	146659	-394139
1725.0	7M30	F9W	DOE M	SD	161583	-349350	SD	160618	-348133
1725.0	7M30	F9W	DOE M	SD	155694	-350559	SD	155497	-352983
1725.0	7M30	F9W	DOE M	SD	156770	-366998	SD	155611	-366140
1725.0	1M60	F9W	DOE B	ID	157400	-400015	ID	159031	-401147
1725.0	7M30	F9W	DOE M	SD	155335	-355048	SD	155023	-354794
1725.0	7M30	F9W	DOE M	SD	160097	-354026	SD	158502	-355000
1725.0	1M60	F9W	DOE M	SD	158955	-371115	SD	158664	-370180
1725.0	7M30	F9W	DOE M	SD	159668	-347274	SD	158198	-348366
1725.0	7M30	F9W	DOE M	SD	158518	-358004	SD	158873	-357974
1725.0	7M30	F9W	DOE M	ND	168761	-373815	ND	168806	-371995

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1725.0	7M30	F9W	DOE M	ND	172730	-349432	ND	171605	-350368
1725.0	7M30	F9W	DOE M	ND	169018	-364098	ND	168615	-362474
1725.0	6M20	F9W	DOE W	MO	131502	-337800	AR	131086	-338236
1725.0	10M0	F9W	DOE B	ID	156763	-402794	ID	156728	-401747
1725.0	10M0	F9W	DOE B	ID	152501	-408437	ID	153132	-409709
1725.0	5M00	F9W	DOE M	WY	151297	-396228	WY	151150	-396216
1725.0	800K	F9W	DOE B	ID	153635	-408579	ID	152502	-408437
1725.0	3M20	F7W	FAA EA	VA	132820	-274326	VA	132825	-274293
1725.0	1M60	F9W	FAA SW	NM	125622	-384534	NM	126128	-383837
1725.0	3M20	D7W	FAA SO	FL	92334	-289557	FL	92856	-289077
1725.0	1M60	F9W	CG 07	PR	66466	-238021	PR	65916	-236850
1726.0	800K	F8E	DOE M	CA	122980	-411400	CA	123512	-410991
1726.0	3M20	D7W	FAA NM	UT	146765	-403083	UT	146897	-403111
1726.0	1M60	D7W	FAA	CA	120946	-413137	CA	121103	-413260
1726.0	2M00	F9W	DOE M	AZ	117788	-401038	AZ	118832	-401493
1726.0	6M40	F9W	DOE M	AZ	122650	-408068	CA	123513	-410991
1727.0	7M30	F9W	DOE M	CO	145318	-379511	CO	145357	-379832
1727.0	2M00	F9W	DOE M	WY	157135	-389613	WY	156448	-389495
1727.0	7M30	F9W	DOE M	CO	147457	-372146	NE	148137	-373052
1727.0	7M30	F9W	DOE M	NE	150334	-373801	NE	150530	-373868
1727.0	2M00	F9W	DOE M	NE	148189	-370762	NE	148292	-370977
1727.0	7M30	F9W	DOE M	NE	150530	-373868	NE	150567	-374198
1727.0	7M30	F9W	DOE M	WY	154837	-386325	WY	153770	-385245
1727.0	10M0	F9W	DOE M	CO	144119	-377925	CO	145281	-378947
1728.0	1M60	F9W	FAA NM	WA	166537	-428818	WA	165695	-427916
1728.0	10M0	F9W	DOE M	SD	154795	-371561	SD	156387	-372428
1729.0	1M90	F9W	DOE M	AZ	117788	-401038	AZ	117845	-401639
1729.0	800K	F8W	CG 17	AK	220080	-526860	AK	219786	-528240
1729.0	5M00	F9W	TC	HI	76712	-567151	HI	77046	-569161
1730.0	1M60	F9W	IRGP	WY	151720	-384894	WY	151762	-384868
1730.0	1M60	F9W	IRGP	WY	153865	-382894	WY	153173	-384180
1730.0	660K	F9W	IRGP	CO	141078	-382766	CO	140709	-382564
1730.0	7M30	F9W	DOE M	SD	155827	-358840	SD	155566	-357951
1730.0	10M0	F9W	DOE M	ND	172741	-356168	ND	170447	-357435

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1730.0	6M40	F9W	DOE M	MT	174100	-388178	MT	174058	-388203
1730.0	5M00	F8E	DOE M	CO	138817	-384924	CO	138363	-385275
1730.0	8M00	F9W	DOE B	WA	173359	-439500	WA	172137	-438921
1730.0	1M60	F9W	IRGP	WY	154277,	-378869	WY	152903	-377593
1730.0	1M98	F9W	FAA AL	AK	220426	-539211	AK	220236	-539939
1730.0	3M50	B7D	FAA	NV	137309	-421922	NV	136032	-420322
1730.0	800K	F9W	FAA AL	AK	218049	-544468	AK	218216	-544619
1730.0	800K	F9W	FAA WP	SM	51610	-614661	SM	51562	-614744
1730.0	1M60	D7W	FAA	NV	142309	-430754	NV	142179	-431159
1730.0	3M20	D7W	FAA GL	MN	160693	-335345	MN	161110	-335618
1730.0	800K	F9W	FAA NM	ID	162074	-410695	ID	162610	-409993
1730.0	3M20	D7W	FAA	HI	76078	-565848	HI	74540	-562553
1731.0	800K	F8W	TVA TVA	TN	130589	-319799	TN	131083	-320525
1733.0	3M20	D7W	FAA SW	NM	126176	-383781	NM	126623	-383641
1733.0	7M30	F9W	DOE M	SD	155974	-362354	SD	155924	-361557
1733.0	800K	F9W	IRLC	AZ	120929	-405782	AZ	120845	-405280
1733 0	3M20	D7W	FAA NM	UT	148081	-403095	UT	147719	-402619
1734.0	3M50	F9W	FAA CE	MO	140844	-340553	MO	141094	-340693
1734.0	3M50	F9W	FAA CE	MO	140844	-340553	MO	141094	-340693
1734.0	1M60	D7W	FAA	CA	131275	-425045	CA	131581	-424086
1734.4	1M60	F9W	FAA SO	VI	66050	-234094	VI	66082	-234092
1734.8	1M60	F9W	FAA SO	PR	65918	-236849	PR	65768	-236752
1735.0	4M70	F9W	DOE W	AR	131032	-324781	MO	130634	-324183
1735.0	7M30	F9W	DOE M	WY	160358	-392616	WY	160438	-391903
1735.0	4M70	F9W	DOE W	AR	131032	-324781	MO	131551	-323861
1735.0	6M20	F9W	DOE W	MO	133089	-336888	MO	133034	-337383
1735.0	7M30	F9W	DOE M	ND	173309	-373435	MT	171759	-375681
1735.0	4M70	F9W	DOE W	MO	132366	-325668	MO	132450	-325534
1735.0	6M20	F9W	DOE W	MO	131502	-337800	MO	132303	-337544
1735.0	6M20	F9W	DOE W	OK	127988	-342497	OK	128112	-342396
1735.0	6M20	F9W	DOE W	OK	130436	-341233	OK	130055	-341595
1735.0	6M20	F9W	DOE W	OK	130020	-345750	OK	128780	-344955
1735.0	6M20	F9W	DOE W	OK	124625	-347240	OK	125610	-347123
1735.0	4M70	F9W	DOE W	AR	129559	-326231	AR	129057	-326600

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1735.0	7M30	F9W	DOE M	NE	150334	-373801	NE	150562	-372982
1735.0	7M30	F9W	DOE M	SD	159668	-347274	SD	160618	-348133
1735.0	7M30	F9W	DOE M	SD	160097	-354026	SD	161300	-351954
1735.0	7M30	F9W	DOE M	SD	157275	-353971	SD	158502	-355000
1735.0	10M0	F9W	DOE M	SD	159766	-361303	SD	159931	-361289
1735.0	7M30	F9W	DOE M	SD	156770	-366998	SD	158018	-368030
1735.0	4M70	F9W	DOE W	AR	128517	-330447	AR	128783	-329386
1735.0	7M30	F9W	DOE M	NE	150562	-372982	NE	150590	-373179
1735.0	7M30	F9W	DOE M	SD	154108	-346895	IA	153104	-346583
1735.0	7M30	F9W	DOE M	SD	158693	-371475	SD	158817	-371677
1735.0	7M30	F9W	DOE M	SD	155694	-350559	SD	154232	-350943
1735.0	7M30	F9W	DOE M	ND	168525	-362626	ND	168615	-362474
1735.0	7M30	F9W	DOE M	MN	168364	-348293	MN	168128	-346402
1735.0	8M00	F9W	TVA TVA	KY	133219	-311483	TN	131361	-311500
1735.0	7M30	F9W	DOE M	ND	168620	-369895	ND	168068	-369417
1735.0	7M30	F9W	DOE M	NE	151572	-370451	NE	151173	-371969
1735.0	2M00	F9W	DOE M	WY	156305	-389437	WY	156448	-389495
1735.0	7M30	F9W	DOE M	NE	152283	-371908	NE	153486	-373052
1735.0	1M60	F9W	DOE B	WA	165991	-442919	WA	166138	-442750
1735.0	800K	F8W	CG 14	HI	77046	-569161	HI	77465	-568801
1735.0	5M00	F9W	FAA WP	CA	127219	-423661	CA	126296	-423296
1735.0	5M00	F9W	TC	HI	77046	-569161	HI	74558	-562541
1735.0	5M00	F9W	TC	HI	70519	-559630	HI	71031	-558206
1735.0	5M00	F9W	TC	HI	77577	-569509	HI	77487	-568798
1735.0	1M60	F9W	DOE B	OR	160638	-446121	OR	160615	-446073
1735.0	10M0	F9W	DOE B	OR	156720	-447026	OR	156608	-447170
1735.0	1M60	F9W	DOE B	ID	156763	-402794	ID	159031	-401147
1735.0	6M40	F9W	DOE M	MT	173850	-402133	MT	172858	-400863
1735.0	5M00	F9W	AR CE	NE	148540	-345375	NE	148926	-345472
1735.0	8M00	F9W	TVA TVA	TN	126340	-306826	TN	126156	-307121
1735.0	7M30	F9W	DOE M	MT	172536	-379825	MT	173124	-380566
1735.0	800K	F9W	DOE B	WA	174344	-430196	WA	173977	-430936
1735.0	4M60	F9W	DOE M	CA	139369	-437339	CA	138968	-437030
1735.0	7M30	F9W	DOE M	CO	146272	-371479	CO	145803	-372220

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1735.0	7M30	F9W	DOE M	CO	145538	-377307	CO	146175	-378239
1735.0	7M30	F9W	DOE M	MN	163201	-345283	MN	161874	-345357
1735.0	7M30	F9W	DOE M	MT	169618	-376110	MT	169581	-377170
1735.0	800K	F9W	DOE B	WA	173977	-430936	WA	172713	-430608
1735.0	8M00	F9W	TVA TVA	TN	130957	-298667	TN	131214	-298593
1735.0	3M50	F9W	DOE B	WA	167325	-429604	WA	167296	-429598
1735.0	8M00	F9W	TVA TVA	TN	129478	-302113	TN	129568	-302264
1735.0	10M0	F9W	DOE M	MT	174630	-395285	MT	173338	-397037
1736.0	6M40	F9W	DOE M	CA	121500	-412281	CA	123512	-410991
1737.0	1M60	F9W	FAA SO	GA	121260	-303933	GA	121168	-303933
1737.5	3M20	D7W	FAA WP	HI	74779	-562460	HI	74540	-562553
1737.5	3M20	D7W	FAA WP	HI	76556	-568095	HI	76709	-567650
1738.0	10M0	F9W	DOE M	NV	126908	-413089	NV	128522	-413590
1739.0	1M60	D7W	FAA	CA	144380	-440046	CA	144526	-440292
1740.0	8M00	F9W	TVA TVA	TN	126691	-304411	TN	126665	-305356
1740.0	3M00	F9W	CG 13	OR	155804	-447728	OR	154202	-448388
1740.0	3M20	D7W	FAA NM	UT	146830	-403027	UT	146785	-403052
1740.0	800K	F9W	FAA SW	OK	127433	-351361	OK	127358	-351365
1740.0	1M60	D7W	FAA	NV	142213	-427212	NV	142151	-429543
1740.0	1M60	D7W	FAA	CA	144526	-440292	CA	143438	-439911
1740.0	1M60	F9W	CG 13	WA	173267	-447495	WA	173343	-445210
1740.0	10M0	F9W	TVA TVA	TN	128542	-319641	TN	127906	-319597
1740.0	6M00	F9W	CG 07	PR	65400	-239700	PR	65340	-241200
1740.0	10M0	F9W	DOE B	WA	172520	-421606	WA	174427	-425011
1740.0	3M50	F9W	TVA TVA	TN	129666	-303033	TN	129673	-302951
1740.0	10M0	F9W	TVA TVA	TN	126000	-324139	TN	126030	-323085
1740.0	8M00	F9W	TVA TVA	MS	125237	-317670	MS	124473	-319656
1740.0	8M00	F9W	TVA TVA	MS	125581	-321726	MS	125142	-321964
1740.0	10M0	F9W	DOE M	SD	157707	-371470	SD	156387	-372428
1740.0	7M30	F9W	DOE M	SD	155827	-358840	SD	156087	-359450
1740.0	2M00	F9W	DOE M	NV	129748	-413994	NV	129584	-413505
1740.0	7M30	F9W	DOE M	ND	168628	-371051	ND	168806	-371995
1742.0	1M60	F9W	DOE B	OR	160638	-443250	OR	161478	-443234
1743.0	1M60	D7W	FAA	NV	137309	-421919	NV	137184	-420319

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1743.0	1M60	D7W	FAA	NV	137309	-421919	NV	136032	-420319
1744.0	6M30	F9W	DOE M	AZ	117788	-401038	AZ	121119	-402521
1745.0	10M0	F9W	DOE B	WA	165975	-428871	WA	165847	-426259
1745.0	7M30	F9W	DOE M	SD	161583	-349350	SD	161300	-351954
1745.0	7M30	F9W	DOE M	SD	162925	-369553	SD	162028	-369331
1745.0	7M30	F9W	DOE M	WY	153450	-384900	WY	153770	-385245
1745.0	7M30	F9W	DOE M	WY	154837	-386325	WY	153850	-382707
1745.0	2M00	F9W	DOE M	WY	155588	-391630	WY	156448	-389495
1745.0	4M70	F9W	DOE W	AR	131032	-324781	AR	129891	-325760
1745.0	7M30	F9W	DOE M	WY	161253	-390015	WY	161263	-389735
1745.0	6M20	F9W	DOE W	AR	127708	-339602	AR	125866	-339747
1745.0	7M30	F9W	DOE M	SD	155694	-350559	SD	155413	-347915
1745.0	7M30	F9W	DOE M	SD	157910	-357004	SD	158502	-355000
1745.0	7M30	F9W	DOE M	SD	158290	-366148	SD	159033	-364137
1745.0	7M30	F9W	DOE M	SD	158664	-370180	SD	158817	-371677
1745.0	7M30	F9W	DOE M	SD	155335	-355048	SD	156712	-356718
1745.0	7M30	F9W	DOE M	SD	160207	-363278	SD	161964	-364610
1745.0	7M30	F9W	DOE M	SD	159669	-358054	SD	158873	-357974
1745.0	800K	F9W	FAA NM	CO	143505	-376823	CO	144828	-376985
1745.0	3M50	F9W	IRMP	CA	146370	-441083	CA	141666	-440839
1745.0	3M20	D7W	FAA SO	FL	92329	-289819	FL	92334	-289557
1745.0	3M20	D7W	FAA NM	UT	148081	-403095	UT	148037	-403000
1745.0	3M00	D7W	FAA NM	UT	146829	-403111	UT	146897	-403111
1745.0	10M0	F9W	DOE B	OR	156137	-443028	OR	158817	-442935
1745.0	5M00	F9W	AR CE	IA	151248	-345660	IA	153042	-346793
1745.0	4M70	F9W	DOE W	AR	128517	-330447	AR	129636	-331141
1745.0	8M00	F9W	TVA TVA	AL	124950	-309337	AL	124959	-309191
1745.0	5M00	F9W	DOE M	WY	149590	-393815	WY	151150	-396216
1745.0	6M20	F9W	DOE W	OK	127202	-341195	OK	127241	-341192
1745.0	6M20	F9W	DOE W	OK	124608	-340899	OK	122950	-340887
1745.0	6M20	F9W	DOE W	OK	127614	-345656	OK	127266	-346046
1745.0	6M20	F9W	DOE W	OK	129125	-342802	OK	128112	-342396
1745.0	4M70	F9W	DOE W	MO	131551	-323861	MO	131466	-322436
1745.0	6M20	F9W	DOE W	MO	133089	-336888	MO	133779	-336023

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1745.0	4M70	F9W	DOE W	AR	128944	-327243	AR	129057	-326600
1745.0	8M00	F9W	TVA TVA	TN	130036	-301734	TN	128928	-301211
1745.0	7M30	F9W	DOE M	SD	161030	-347259	MN	161874	-345357
1745.0	7M30	F9W	DOE M	CO	144024	-382915	CO	144486	-382219
1745.0	2M00	F9W	DOE M	CO	143565	-382800	CO	143741	-382568
1745.0	10M0	F9W	DOE M	CO	145281	-378947	CO	148918	-379192
1745.0	5M00	F9W	DOE B	WA	172520	-421606	WA	174427	-425011
1745.0	1M60	F9W	DOE B	WA	166558	-445954	WA	166113	-445822
1745.0	5M00	F8E	DOE M	CO	138817	-384924	CO	138772	-383231
1745.0	10M0	F9W	DOE B	OR	158583	-444605	OR	158141	-446005
1745.0	1M60	F9W	DOE B	OR	165330	-429526	WA	165362	-430679
1745.0	10M0	F9W	DOE B	OR	156720	-447026	OR	155557	-447495
1745.0	7M30	F9W	DOE M	WY	158907	-391758	WY	160438	-391903
1745.0	10M0	F9W	DOE B	OR	155704	-446802	OR	155569	-446666
1745.0	10M0	F9W	DOE B	ID	156493	-400927	ID	156728	-401747
1745.0	10M0	F9W	DOE B	ID	157344	-400835	ID	158374	-400817
1745.0	1M60	F9W	DOE B	ID	160172	-400723	ID	159031	-401147
1745.0	800K	F9W	DOE B	ID	156821	-409493	ID	152502	-408437
1745.0	1M60	F9W	DOE B	WA	172954	-443173	WA	172858	-442534
1745.0	7M30	F9W	DOE M	MT	167374	-380431	MT	168939	-378603
1745.0	7M30	F9W	DOE M	ND	169901	-350287	ND	171605	-350368
1745.0	7M30	F9W	DOE M	ND	167257	-370720	ND	165835	-369430
1745.0	7M30	F9W	DOE M	ND	168920	-354067	ND	168863	-352407
1745.0	7M30	F9W	DOE M	CO	147457	-372146	NE	148189	-370762
1745.0	7M30	F9W	DOE M	ND	168655	-367812	ND	168887	-366029
1745.0	6M40	F9W	DOE M	MT	173613	-384468	MT	174911	-385528
1745.0	7M30	F9W	DOE M	NE	150334	-373801	WY	149196	-375635
1745.0	10M0	F9W	DOE M	SD	158587	-347892	SD	158198	-348366
1745.0	6M40	F9W	DOE M	MT	174704	-391650	MT	173932	-389833
1745.0	7M30	F9W	DOE M	MT	166844	-384117	MT	165827	-386054
1745.0	7M30	F9W	DOE M	MT	169618	-376110	MT	171759	-375681
1745.0	7M30	F9W	DOE M	MN	164105	-345658	MN	164368	-345339
1745.0	7M30	F9W	DOE M	MN	167327	-345708	MN	168121	-346380
1745.0	7M30	F9W	DOE M	CO	145538	-377307	CO	146175	-377325

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1745.0	7M30	F9W	DOE M	ND	168964	-356830	ND	169084	-358615
1746.0	2M00	F9W	FAA NM	OR	164515	-442530	OR	163102	-442418
1746.0	2M00	F9W	FAA NM	OR	152522	-442354	OR	152585	-442311
1746.4	1M60	F9W	FAA SO	VI	66077	-233900	VI	63844	-232923
1746.4	1M60	F9W	FAA SO	PR	65473	-241619	PR	65772	-241734
1746.4	1M60	F9W	FAA SO	PR	65420	-239728	PR	64773	-239470
1747.5	3M20	D7W	FAA WP	HI	77030	-569165	HI	77428	-569311
1747.5	1M60	F9W	FAA WP	HI	74540	-562553	HI	76556	-568085
1747.5	3M20	D7W	FAA WP	HI	74753	-565088	HI	74540	-562553
1748.0	6M40	F9W	DOE M	AZ	117612	-411606	AZ	117665	-412089
1748.0	7M30	F9W	DOE M	CO	144918	-372953	CO	145803	-372220
1750.0	1M60	F9W	FAA SW	NM	126910	-387348	NM	126174	-383835
1750.0	1M60	F9W	FAA SO	PR	65772	-241254	PR	65339	-241159
1750.0	1M60	F9W	FAA NM	WA	169917	-429549	WA	169883	-429565
1750.0	10M0	F9W	DOE M	MT	173286	-398716	MT	172858	-400863
1750.0	6M40	F9W	DOE M	AZ	120393	-403739	AZ	120872	-405280
1750.0	800K	F9W	DOE M	AZ	117788	-401038	AZ	115390	-399088
1751.0	1M60	F8E	DOE M	CO	138675	-381901	CO	138634	-381927
1752.0	800K	F9W	FAA WP	SM	51610	-614661	SM	51562	-614744
1752.0	1M60	F9W	FAA SO	PR	66427	-237569	PR	66374	-237547
1753.0	2M00	F8W	CG 07	VI	63920	-233275	VI	66092	-233902
1754.0	7M30	F9W	DOE M	MT	162689	-388630	WY	161263	-389735
1754.0	1M60	F9W	DOE B	WA	169534	-440533	WA	169864	-440541
1754.0	6M40	F9W	DOE M	CA	118988	-413379	AZ	117665	-412089
1754.0	7M30	F9W	DOE M	NE	150334	-373801	NE	151173	-371969
1754.0	10M0	F9W	DOE M	WY	160246	-392863	WY	160438	-391903
1754.0	2M00	F9W	DOE M	WY	148808	-380116	WY	148438	-379596
1754.0	7M30	F9W	DOE M	WY	158907	-391758	WY	156448	-389495
1754.0	7M30	F9W	DOE M	WY	148118	-376722	WY	147772	-377604
1755.0	8M00	F9W	TVA TVA	AL	125582	-308724	AL	124959	-309191
1755.0	6M40	F9W	DOE M	MT	173850	-402133	MT	173265	-402971
1755.0	1M00	F9W	TVA TVA	TN	129400	-303803	TN	129387	-303864
1755.0	8M00	F9W	TVA TVA	TN	131259	-298115	TN	131214	-298593
1755.0	8M00	F9W	TVA TVA	TN	126691	-304411	TN	126540	-303029

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1755.0	7M30	F9W	DOE M	MT	169618	-376110	MT	170289	-379073
1755.0	8M00	F9W	TVA TVA	KY	133219	-311483	KY	134119	-313124
1755.0	3M50	F9W	DOE B	WA	167281	-429533	WA	167296	-429598
1755.0	8M00	F9W	TVA TVA	TN	126227	-307200	TN	126201	-307386
1755.0	6M20	F9W	DOE W	OK	130020	-345750	OK	130140	-346508
1755.0	5M00	F9W	DOE M	CO	140720	-389603	CO	141108	-388979
1755.0	6M20	F9W	DOE W	OK	126309	-346223	OK	125610	-347123
1755.0	1M60	F9W	DOE B	WA	166558	-445954	WA	167117	-445655
1755.0	800K	F9W	DOE B	WA	167980	-442616	WA	167483	-441328
1755.0	5M00	F9W	DOE B	WA	174088	-424255	WA	174427	-425011
1755.0	1M60	F9W	DOE B	MT	173682	-411519	MT	172848	-411716
1755.0	1M60	F9W	DOE B	ID	158374	-400817	ID	159031	-401147
1755.0	5M00	F9W	AR CE	IA	149776	-345720	IA	151248	-345660
1755.0	7M30	F9W	DOE M	MN	165260	-345255	MN	166228	-345369
1755.0	7M30	F9W	DOE M	SD	160955	-370023	SD	158817	-371677
1755.0	6M40	F9W	DOE M	MT	174704	-391650	MT	175173	-393557
1755.0	7M30	F9W	DOE M	MT	167374	-380431	MT	166600	-382146
1755.0	6M40	F9W	DOE M	MT	174100	-388178	MT	174911	-385528
1755.0	7M30	F9W	DOE M	ND	168236	-351168	ND	175799	-349013
1755.0	7M30	F9W	DOE M	ND	169856	-365153	ND	168887	-366029
1755.0	7M30	F9W	DOE M	ND	168726	-360824	ND	168615	-362474
1755.0	7M30	F9W	DOE M	ND	167257	-370720	ND	168806	-371995
1755.0	7M30	F9W	DOE M	ND	168920	-354067	ND	168757	-355266
1755.0	10M0	F9W	DOE M	NV	129341	-413397	NV	128522	-413590
1755.0	7M30	F9W	DOE M	SD	154108	-346895	SD	155413	-347915
1755.0	8M00	F9W	TVA TVA	AL	124933	-313626	AL	124597	-313384
1755.0	7M30	F9W	DOE M	SD	159668	-347274	SD	159789	-347535
1755.0	6M40	F9W	DOE M	MT	172835	-383200	MT	172907	-382727
1755.0	7M30	F9W	DOE M	SD	162925	-369553	SD	163832	-369514
1755.0	7M30	F9W	DOE M	SD	160207	-363278	SD	159033	-364137
1755.0	7M30	F9W	DOE M	SD	160097	-354026	SD	159703	-353584
1755.0	7M30	F9W	DOE M	SD	155335	-355048	SD	155726	-353977
1755.0	7M30	F9W	DOE M	SD	157910	-357004	SD	158873	-357974
1755.0	7M30	F9W	DOE M	SD	156869	-347941	SD	156954	-347939

Freq (MHz)	Bndwdth	EmsClss	Licensee	TxState	TxLat (sec.)	TxLon (sec)	RxState	RxLat (sec)	RxLon (sec)
1755.0	7M30	F9W	DOE M	SD	153363	-346700	IA	153104	-346583
1755.0	6M20	F9W	DOE W	AR	130696	-339725	AR	131086	-338236
1755.0	3M50	F9W	DOE W	AR	130556	-332089	AR	130907	-333354
1755.0	3M50	F9W	DOE W	MO	132017	-334360	MO	133007	-335532
1755.0	4M70	F9W	DOE W	MO	132738	-323476	MO	131551	-323861
1755.0	6M20	F9W	DOE W	MO	131466	-322436	MO	131678	-322453
1755.0	7M30	F9W	DOE M	SD	155827	-358840	SD	155924	-361557